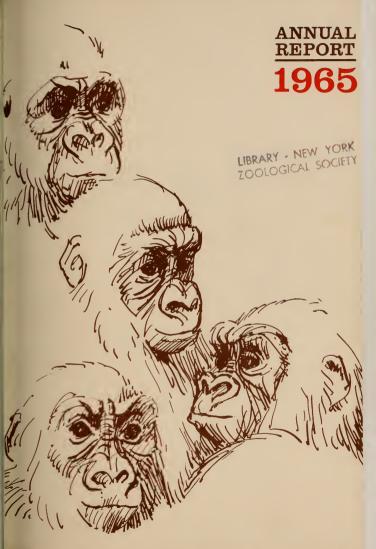




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THE NEW YORK ZOOLOGICAL SOCIETY



1965

THE SOCIETY'S OFFICES 630 FIFTH AVENUE, NEW YORK 10020

THE ZOOLOGICAL PARK BRONX PARK, BRONX 10460 THE AQUARIUM CONEY ISLAND, BROOKLYN 11224



# THE ZOOLOGICAL SOCIETY IN 1965

FAIRFIELD OSBORN, President

It might seem a contradiction to use the word *monotonous* in describing the growth and expansion of the Society's activities in recent years. After all, even the story of growth, if a repetitive one, can, to some degree, be thought of as monotonous. In preparing these successive Annual Reports, the same theme runs through all of them, namely, an unvarying record of new accomplishments. If this is monotony, let's have lots more of it!

Almost every year there are important developments that this annual review should stress. It is well known that in the last two or three years a broad program of physical improvements, including new buildings and other types of exhibits, is under way at the Zoological Park. At the same time a similar program is being initiated at the Aquarium in Coney Island. It may be generally observed that concepts for the exhibition of captive animals are going through a period of revolutionary change. The extraordinary success of the new Aquatic Birds Building, which opened in 1964 and which many visitors speak of as a "revelation," is a fine harbinger for the other new projects now under way. In the Aquarium, as well as at the Zoo, we find ourselves faced with unusually exciting possibilities that will involve original methods of exhibition and at the same time contribute substantially to the welfare and contentment of the wild animals in our care. It would be a gross error to minimize the key importance of the physical development and improvement of these two institutions. They represent our major responsibility.

# LABORATORIES OF MARINE SCIENCES

The year 1965 will be especially remembered for two developments in the field of science which, in many respects, are the most notable the Society has ever undertaken. The first of these is the construction adjacent to the Aquarium of the Laboratories of Marine Sciences, a new and original type of building which will offer full play and unusual facilities to the advancement of knowledge of many key aspects of marine biology.

In an article in the *New York Times* headlined "THERAPY FROM THE SEA—Biochemical Research at Aquarium May Explain Illnesses of Mankind," Dr. Howard A. Rusk, Director of the Institute of Physi-

cal Medicine and Rehabilitation of New York University Medical Center, had this to say:

"Although the New York Aquarium has made greater use of its facilities for research than any other public aquarium, it has been able to take only limited advantages of the available resources for scientific investigation.

"The New York Aquarium is in a unique position to conduct research with its large and costly physical plant, its collection of aquatic animals and plants from various parts of the world, its specialized knowledge and its unlimited supply of pure sea water.

"Increased research in the new field of marine pharmacology has great potentials for the development of sources of new biologics and information on physiological and biochemical processes."

#### INSTITUTE FOR RESEARCH IN ANIMAL BEHAVIOR

The other major step in the field of scientific work was taken in the latter part of the year through the establishment of the Institute for Research in Animal Behavior. This new, and in certain respects unique, department will be operated jointly with The Rockefeller University. It seems appropriate in this report to quote the statements made by Detlev Bronk, President of Rockefeller University, and myself on behalf of our Society at the time this auspicious collaboration was publically announced.

# Said Dr. Bronk:

"Man's enduring curiosity about the behavior of animals is reason enough for the creation of this Institute. But it has an especial and urgent significance too in these times when science and technology enable man to change and profoundly reshape the surface of the planet on which we live with other creatures. As we thus alter the physical and social forces to which all living beings are subject, we affect the processes of life and the patterns of behavior. From the study of how animals behave in their natural environment and how changes in the environment affect their behavior, we may gain precious clues to the determinants of our own behavior. And then perhaps man will use more wisely his vast new powers to plan the modifications of his surroundings and the forces of nature that control him.

"When I first discussed this cooperative undertaking with Professor Dubos, his perceptive vision moved him hopefully to say: 'I have no doubt that we shall soon witness a new revolution in biological thought and a reorientation of biological research if we can provide an intellectual home and research facilities for the study of the response of the living organism to its total environment."

# This was my statement:

"The creation of this new Institute means more, we may hope, than the launching of but one more effort to analyze animal behavior as such. The horizons it intends to explore are less limited than those that may be viewed within a laboratory and, in turn, more specific than those within the boundless expanses of nature. The goals of understanding the Institute seeks to reach concern the behavior of all living organisms, whether animal or human. It recognizes the many similarities between both, inherited and melded through countless past ages.

"The arrangement by which The Rockefeller University, with its great reservoir of scientific talent, will work in partnership with our Zoological Society justifies the hope that our combined efforts will yield rich results through gaining greater knowledge of the motivations and actions of all living organisms, and thus add to the betterment of human life."

#### WILDLIFE PROTECTION

Another principal area of the Society's work is that of wildlife protection in various parts of the world. All in all, the situation is, generally speaking, somewhat more hopeful due to the growing worldwide recognition of the crisis facing wildlife. On the other hand, it would be a gross error to become optimistic about the long-term survival of many species of wild animals, whether terrestrial mammals, birds and reptiles, or various forms of marine life. Unhappily, we need to recognize that the actual survival of many species is highly doubtful. This is an inescapable fact about which we should have no delusions. This is not to imply, however, that these losses will occur rapidly. It is a matter of slow attrition, of a steady downward trend over a period of years. This very fact gives grounds for hope. It provides time for action which, if not successful in actually reversing the trend, can at least minimize the losses involved in it. In our own country the situation is relatively favorable due to the fact that over the last 30 or 40 years there has been ever-increasing public consciousness of the values of wildlife. In the main, we have done a good job. Success has stemmed in large part from the creation of a large number of National Parks and other refuges where wildlife is inviolate. Even then, various animals-such as Polar and Grizzly Bears, Walruses,

Bald Eagles and other raptors, and a number of other species—are on or near the critical list.

The values of National Parks or other official reserves are so evident that much of the Society's efforts in the field of wildlife protection are being aimed, at this time, in extending aid to reserves abroad, especially in East Africa. We are trying to foster a reserve for Lowland Gorillas in Western Equatorial Africa. In addition we are contributing to educational programs and field studies on that continent and elsewhere. In our own country we have been one of the principal sponsors and financial supporters of extensive and objective study of the proposed Rampart Dam in Alaska, which would submerge about eight million acres of land that contains substantial wildlife values. The reservoir would have a surface area of about 10,500 square miles, or a body of water somewhat larger than Lake Erie. We hope that the report embodying the results of this study will prove a strong influence in preventing the plan.

#### GENERAL DEVELOPMENT FUND

While involved in all these activities, it is gratifying to report that interest in them and the support being accorded them are finding wide response. None of these ideas can be carried out without very substantial financial support, and progress is being made in this area. During the year our fund campaign has, through gifts, legacies and grants, received an aggregate amount of \$867,000, bringing the total of our General Development Fund campaign at the year's end to \$7,939,000. At its meeting on December 15th, 1965, the Board of Trustees cited our campaign goal to be \$10,000,000. So it can be reported with some satisfaction that we are presently nearly four-fifths of the way to reaching it. Needless to say, it is profoundly hoped that we shall reach this goal in the very near future.

# MEMBERSHIP

Another evidence of the growing interest in the Society's work is the steady growth of our membership. At the year's end the number of dues-paying members in various classes was 5,742, a new high in the history of the Society.

# TRUSTEES

It saddens me to report the death of Mr. Childs Frick, who could have appropriately been thought of as the "elder statesman" of our Board. Mr. Frick was deeply interested in animals, was well versed in zoology and became eminent as a paleontologist. Through 33 years

he served with great devotion as a Trustee. In addition, he was one of the most generous benefactors the Society has ever had.

During the year, the Society elected as new Trustees the following: Anthony D. Marshall, Peter Matthiessen, Augustus G. Paine, II, David T. Schiff and Landon K. Thorne, Jr.

At the December meeting of the Board, Dr. Henry Clay Frick was elected Second Vice-President of the Society.

#### STAFF

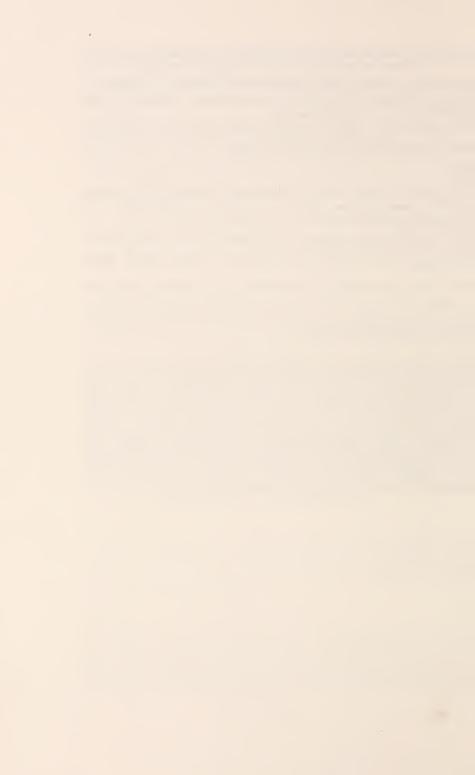
This was a year that saw the retirement of Herbert F. Schiemann, who with exemplary care and high professional ability had served as Comptroller of the Society for a period of 20 years.

John L. Miller was appointed Associate Curator of Publications, with the idea that he would succeed William Bridges upon his retirement in 1966.

The initial and key appointment for the new Institute for Research in Animal Behavior was the designation of Dr. Donald R. Griffin as its Director. Dr. Griffin was previously Chairman of the Biology Department at Harvard University.

. . .

The activities of the year, reflected not only in the above report, but also through the departmental reports that follow, scarcely need any concluding observations. But I do want to make it clear that there is an ever-increasing need for the services of our institution, whether for the public in recreation and education, for conservation or, finally, for research in the biological sciences. As our world becomes ever more mechanized and urbanized, this need is bound to increase steadily. It would be derelict not to point out that only with adequate resources can we meet the opportunities that lie ahead.



# THE ZOOLOGICAL PARK

#### THE DIRECTOR'S REPORT

WILLIAM G. CONWAY, Director

ZOOLOGICAL PARK DIRECTORS have customarily explored current concepts in the philosophy of zoo operation in the Annual Report. These statements, dating from the time of Dr. Hornaday, now form an informative record of development and a useful promulgation of changing goals and objectives. Recent conversations with Mrs. Elinor C. Guggenheimer of the City Planning Commission resulted in the presentation of yet another answer to the question: "Why have a zoo?" In this case, Mrs. Guggenheimer's stimulating queries were answered in a long personal letter during October. Parts of this letter are reproduced below.

"When a biologist has written a few paragraphs and is fumbling for a way to begin another, he quotes Aristotle. I could plunge into the answer to your question 'Why have a zoo?' by quoting Aristotle: 'All men by nature desire to know.' That's a pretty good premise, but not specific enough. A less frequently quoted philosopher (W. G. Conway, in fact) tried his hand at it in the 1962 Annual Report of the New York Zoological Society:

The increasing expansion of city as opposed to rural populations, in particular the incredible population growth in the New York area, presents peculiar obligations. Generations are growing up without any natural contact with wild creatures; a new public opinion concerning wildlife and wild environment is arising unfettered and unguided by fact or experience. Except at the Zoo, the opportunities to know or even become interested in wild creatures are largely vicarious ones for many city dwellers. The opinions of these people will shape the future of wild lands and wild creatures.

"Different people look at these things differently, of course. A Bronx shopkeeper wrapped up the answer to your question in one neat package when he remarked to me that "The Zoo brings people and that's good for business!"

"That's one man's answer. Our Charter had another, expressed in the statement of the Zoological Society's purpose: '. . . for the promotion of zoology and kindred subjects, and for the instruction and recreation of the people.' That's as valid today as it was in 1895, and I especially like the 'instruction and recreation of the people' phrase becase it touches on both sides of the Zoo's function.

"Instruction—that is, education. Naturally, the Zoo's educational functions and methods are not those of the classroom, but they do supplement formal classroom education and make up for some of its shortcomings. They bring to life a whole segment of the world that otherwise most people could only read about, and one of the best things about them is that people are eager for them. Most adults and children certainly come to the Zoo voluntarily; we don't have to employ truant officers to bring them in! And I may add that children are unusually receptive to the kind of knowledge the Zoo can give them.

"We have to recognize the fact that nowadays education in the physical sciences and molecular biology overshadows classroom studies in the biology of whole animals; more time is spent on the trees and less on the forest. As I see it, this increases the Zoo's educational responsibilities enormously.

"The Zoo functions *directly* to broaden its visitors' base of scientific literacy. It provides insights into behavior of animals—and man himself. It interprets wildlife in relation to nature, illustrates the evolution of animal life and adaptation to environment. Broadly it reveals the interrelationship of animal societies and, ultimately, of animals and man.

"Man's biological background is mirrored in the creatures that share the world with him and it is our job to make this plain; in short we must help man to understand man by presenting the lower creatures to him in an orderly way.

"The wild places of the world are shrinking and the number of animals with them. Zoos are the repositories of some irreplaceable living treasures. As time goes on we can expect that more and more species will have to be tided over in zoos during periods of change in their homelands; there will be no other way of preserving them to enrich the lives of future generations.

"The urgency of our educational problem in conservation brings to mind my favorite quotation from William Beebe, our first Curator of Birds and for many years the Director of the Society's Department of Tropical Research. Will wrote:

The beauty and genius of a work of art may be reconceived, though its first material expression be destroyed; a vanished harmony may yet again inspire the composer; but when the last individual of a race of living things breathes no more, another heaven and another earth must pass before such a one can be again.

"The list of teaching opportunities in the Zoo could be extended in a dozen directions. They range from enhancing an understanding of geography to the development of a mature concept of sex, and from an appreciation of the meaning of the term 'renewable resources' to concrete ideas about the evolution of man. There are ways—and the Zoo must find and employ them—of putting across the idea that human beings, whether black, brown, yellow or white, are actually *one* species. The Zoo can perhaps do this more directly and better than any other institution, for concepts and examples of species are ever-present in its thinking and planning.

"Then there are the intangibles, felt but not capable of demonstration. Can we hope that a really good Zoo exhibit may arouse an emotional response that will include increased sensitivity to other animals and their behavior—even, perhaps, to people? Human behavior is not an isolated phenomenon. Is it too much to hope that there might be some tiny lesson, at least for some of our visitors, in the spectacle of lion family life or a gibbon's assiduous care for her offspring?

"Who knows how much we are capable of stimulating imagination, good taste, and esthetic sense?

"Unmistakably we give some visitors a new intellectual reference point, a view of another sensory and social world. Sudden insights come as visitors pass from exhibit to exhibit; we overhear exclamations and remarks that rejoice us.

"It occurs to me that cultural institutions do not, like commercial institutions, conduct visitor surveys to determine what their visitors want; they conduct studies to find out what their visitors are. For it is the obligation of a cultural institution not simply to respond to ill-founded visitor wishes but rather to shape the visitor's wishes by imparting knowledge and beauty. To do otherwise would lead to pornography in the Met and lion versus tiger fights at the Zoo!

"We all know too well what is happening to the lands, forests and and waters of the world, for conservation is part of our business. But it is not easy for the dweller in a great, sprawling city to sense it. Animals, wild animals, are prime indicators of the shrinking wilderness; there they stand, labelled 'Endangered Species', 'All but extinct in the wild', even—in several instances—'No longer found in the wild.' The lesson cannot help but strike home especially when we are compelled to point out that the animal is endangered or vanishing because its habitat is being destroyed.

"Passing on from the educational and cultural contribution of the Zoo, we come to the other half of the phrase in the Society's Charter:

"... recreation of the people." As a matter of fact, even here we haven't passed on from educational and cultural contributions; there's no law that says you can't learn something while having fun in the Zoo.

"As a recreational resource, it's hard to find anything to compare to zoos. More than 80 million people will visit American zoos this year—and that's more than the combined attendance at all the national football and baseball games. Naturally they didn't go to zoos to be educated; they went for recreation. But it's a mighty poor zoo that doesn't give them some bit of knowledge to carry away, and a really imaginative, top-notch zoo can reach into their minds with almost every exhibit.

"Along this line of thinking, I want to stress the fact that zoos are basically aimed at adults. 'The zoo is for kids' is a myth. At the San Diego Zoo, visitors 16 and older make up 55.2% of the attendance. At the Frankfurt Zoo, 27% of the visitors are under 15 and an overwhelming 73% are older. Chicago Zoo reports 2.39 adults to each child. You will notice that these three zoos—the only ones for which I have child-adult figures—are big, progressive and imaginative. They get a big proportion of adult attendance because they offer adult intellectual, cultural and recreational fare.

"One conclusion seems inescapable to me: Zoos should consciously upgrade the presentation and educational level of their exhibits. We can hardly raise our sights too high. As long as we present natural history in layman's terms instead of scientific jargon, we can't go wrong. The animals will see to it that the education is leavened with recreation!

"The recent increases in leisure time coupled with the very definite limit on how far a routine worker can rise in his work and achievement add up to a depressing modern combination. The zoo's importance in helping to usefully occupy leisure time and to direct frustrated drives into satisfying cultural pursuits is as obvious as it is important. Besides, the zoo tries to create a curiosity about nature which it can only partially satisfy, encouraging the city zoo-goer, aided by modern mobility, to visit the out-of-doors.

"I wonder how many city-dwellers have for the first time in their lives visited national parks and wildlife refuges because of interests they acquired in casual visits to a zoo?

"The promotion of zoology has been one of the Zoological Society's aims from the beginning, and as long as we're asking 'Why have a zoo?' part of the answer is 'for basic research in zoology.'

"Most of our current research is being done at the Aquarium (and even in other lands), but our most notable scientific program began

in the Zoo. That was the tropical research program Dr. William Beebe established; it still has a world-wide reputation. Now we are about to bring a major part of the Society's scientific work back to the Zoo with a department that will use our great and varied collection for behavioral studies.

"I do not need to labor the point with you that the Zoo's interests and fields of service, like those of the other cultural institutions around town, are not merely local. We hold our animals in trust for everyone and for the future, just as the Metropolitan Museum of Art holds its paintings. Public-spirited individuals have always recognized that fact—hence the magnificent array of cultural institutions in New York City."

#### NEW DEVELOPMENTS

In 1965, the Society again made special appropriations to employ supplementary night watchmen, but this year a security dog patrol was also established during August. It has already received wide publicity and surprising public support, and, most important, it is effective.

The Society's request to the New York State Legislature for charter revision to provide for a more realistic admission policy was not acted upon. Similar requests from the New York and Brooklyn Botanical Gardens also failed to receive attention from the Legislature.

During November, contruction began on the World of Darkness, the Zoo's long-planned building for the exhibition of nocturnal animals. Exceptionally complex, the new structure will open some time in 1967. It will contain 34 major exhibits and many smaller displays. Growing out of experiments conducted by Mammal Curator Davis at the Small Mammal House, the design of the new structure has involved Messrs. Conway, Davis and Driscoll in literally scores of meetings with an exceptional team of architects from the firm, Morris Ketchum, Jr. and Associates. The Zoo Designer, Jerry Johnson, has also spent much time meeting with Director and Curators and preparing preliminary designs for what we hope will prove the most exciting animal exhibit yet constructed.

Several new displays of special interest were completed by Zoo forces during the year and one of these is a notable innovation. In February, a large cage in the Monkey House became a scene for the creation of the first major attempt at a habitat exhibit for large primates. Gradually, under the guidance of Designer Johnson, an amazing section of west African rain forest grew over the cage's ugly pipe trapezes and concrete ledges. Dappled forest sunlight replaced harsh floodlights and a huge buttress-rooted jungle tree fills one

corner, while mossy boulders and hanging lianas add atmosphere. Finally, the Zoo's superb family of Mandrills was moved in and the lovely scene was complete. We hope this new display, built entirely of fiberglas, will prove to be the first of many successful habitat exhibits for primates, which so quickly demolish attempts to decorate their enclosures with natural plants and landscaping.

Other significant zoo improvements include the completion of five small moated exhibits on the east side of the Kangaroo House for the display of duikers and other small animals of Africa's forests. This project was paid for substantially by the City of New York as a Capital Budget item. A series of attractively landscaped paddocks for cranes and other large birds was developed behind the Ostrich House by Zoo forces. The visitor views the birds from a winding raised walkway. Yet another project worthy of special mention was the initiation of a labelling program for Park trees. Messrs. Driscoll and Bridges have now identified and labelled more than 300 trees bordering Zoo walks.

Unhappily, Zoo trees were a special 1965 concern for other reasons. We are justly proud of our magnificent oaks, beautiful elms and huge beeches, but the continuation of a drought into the fourth year in New York, combined with elm disease, has resulted in a shocking loss of Zoo forest cover. More than 900 trees were lost in 1965 and, of these, 400 were more than six inches in diameter. Many ornamental zoo plantings have also been badly damaged.

The redevelopment of the Zoo Bar Restaurant into a self-service operation in 1964 proved so successful that Flamingo Terrace was subsequently modified in 1965 to provide more rapid service. The new operation is a success. Zoo facilities income for the purchase of animals and for zoo improvements—badly needed funds to meet rising expenses—established a new high during 1965.

The Aquatic Birds Building completed its first year of operation to the heartening sounds of public approbation (comments, letters, even contributions) and professional accolade. The birds like it too and a surprising number of rarities bred to prove it (see the report of the Bird Department).

In fact, the Zoo's breeding program is proceeding well in all animal departments. The Society was especially pleased to receive the Edward Bean Rare Mammal Breeding Award of the American Association of Zoological Parks and Aquariums for the breeding of mouse deer.

Mammals, birds and reptiles born or hatched at the Zoo in 1964 and 1965 are listed below:

#### MAMMALS

#### MARSUPIALIA

Agile Wallaby-Protemnodon agilis

#### **PRIMATES**

Silvered Leaf Monkey—Presbytis cristatus cristatus Talapoin Monkey—Cercopithecus talapoin Japanese Macaque—Macaca fuscata yakui Gelada Baboon—Theropithecus gelada Mandrill—Mandrillus sphinx

#### RODENTIA

Southern Grasshopper Mouse—Onychomys torridus torridus Florida Cotton Rat—Sigmodon hispidus hispidus Mongolian Gerbil—Meriones unguiculatus Asiatic Brush Rat—Golunda ellioti Asiatic Fawn-colored Forest Mouse—Mus cervicolor Palestine Spiny Mouse—Acomys cahirinus dimidiatus Paraguayan Agouti—Dasyprocta paraguayensis Chinchilla—chinchilla laniger

#### CARNIVORA

Eastern Raccoon—Procyon lotor American Marten—Martes americana actuosa Lion—Panthera leo

#### ARTIODACTYLA

Pigmy Hippopotamus—Choeropsis liberiensis Llama-Lama glama Guanaco-Lama huanacus Large Malayan Mouse Deer-Tragulus napu Reeves Muntjac-Muntiacus reevesi Axis Deer—Axis axis Barasingha Deer-Cervus duvauceli Formosan Sika Deer-Cervus nippon taiouanus Dybowski Sika Deer-Cervus nippon hortulorum Red Deer-Cervus elaphus Roosevelt Elk—Cervus canadensis roosevelti Père David Deer-Elaphurus davidianus Reindeer—Rangifer tarandus Chinese Water Deer-Hydropotes inermis Nyala—Tragelaphus angasi Yak—Poephagus grunniens Wisent-Bison bonasus bonasus Bison—Bison bison bison Jackson Hartebeest-Alcelaphus buselaphus jacksoni Gemsbok—Oryx gazella gazella

Blesbok—Damaliscus dorcas phillipsi White-tailed Gnu—Connochaetes gnou Blackbuck—Antilope cervicapra Impala—Aepyceros melampus rendilis Thomson Gazelle—Gazella thomsoni Siberian Ibex—Capra ibex sibirica Aoudad—Ammotragus lervia Mouflon—Ovis musimon

#### BIRDS

#### SPHENISCIFORMES

Humboldt's Penguin-Spheniscus humboldti

#### TINAMIFORMES

Zabele's Red-footed Tinamou—Crypturellus noctivagus zabele Tataupa Tinamou—Microcrypturus tataupa tataupa

#### CICONIIFORMES

African Cattle Egret—Bubulcus ibis ibis Black-crowned Night Heron—Nycticorax nycticorax hoactli Panama Boat-billed Heron—Cochlearius cochlearius panamensis

#### ANSERIFORMES

Fulvous Tree Duck-Dendrocygna bicolor Eastern Canada Goose—Branta canadensis canadensis Barnacle Goose-Branta leucopsis Greenland White-fronted Goose-Anser albifrons flavirostris Western Gray-lag Goose-Anser anser anser Bar-headed Goose-Anser indicus Blue Goose—Anser caerulescens caerulescens Lesser Snow Goose—Anser caerulescens hyperborea Black-necked Swan-Olor melanocoryphus Ashy-headed Upland Goose-Chloephaga poliocephala Lesser Magellan Upland Goose—Chloephaga picta picta European Shelduck-Tadorna tadorna Mallard Duck-Anas platyrhynchos platyrhynchos Laysan Teal—Anas platyrhynchos laysanensis Chestnut-breasted Teal—Anas castanea Sharp-winged Teal—Anas flavirostris oxyptera Falcated Teal—Anas falcata Chiloe Widgeon—Anas sibilatrix Southern Baliama Pintail—Anas bahamensis rubirostris Chilean Pintail—Anas georgica spinicauda Red-billed Pintail—Anas erythrorhyncha Cape Teal—Anas capensis Prairie Blue-winged Teal—Anas discors discors Ringed Teal—Anas leucophrys Northern Eider Duck-Somateria mollissima borealis Red-crested Pochard-Netta rufina Rosy-billed Duck-Netta peposaca White-eyed Duck—Aythya nyroca

Tufted Duck—Aythya fuligula Mandarin Duck—Aix galericulata Wood Duck—Aix sponsa Barrow's Golden-eye—Bucephala islandica

#### GALLIFORMES

Crested Wood Partridge-Rollulus roulroul

#### Gruiformes

Wattled Crane—Bugeranus carunculatus Common Coot—Fulica americana americana Sun-bittern—Eurypyga helias helias

#### CHARADRIIFORMES

African Spur-winged Plover—Hoplopterus spinosus Kittlitz's Sandplover—Charadrius pecuarius pecuarius Killdeer—Charadrius vociferus vociferus Black-necked Stilt—Himantopus himantopus mexicanus Oriental Pratincole—Glareola maldivarum Ring-billed Gull—Larus delawarensis Laughing Gull—Larus atricilla Silver Gull—Larus novae-hollandiae novae-hollandiae Inca Tern—Larosterna inca

#### CORACHFORMES

Eastern White-collared Kingfisher-Halcyon chloris armstrongi

#### REPTILES

Reeve's Turtle—Chinemys reevesi
Blue-tongued Skink—Tiliqua scincoides
Boa Constrictors—Boa constrictor
Neotropical Milksnake—Lampropeltis doliata nelsoni
Blood Python—Python curtus
King Cobra—Ophiophagus hannah
Hybrid Treeboa—Corallus enydris enydris x C. e. cooki

Zoo breeding successes and the improved animal management they represent are heartening, but one troubling animal management problem requires special comment, the feeding of zoo animals by the public. The serious illness of several of our great apes and several other animals because of improper foods given to them by the public caused great consternation last spring. The danger to the public which ensues from stepping over guard rails to feed animals is yet another concern. The Zoo has attempted to combat this problem by making suitable animal foods with careful instructions available to the public for feeding from vending machines at a nominal fee, but this seems only to have confused the delineation of important, no feeding areas. As 1965 drew to a close, it was decided to remove all animal food vending machines and to attempt to institute a general "no feeding"

policy in the Zoo. Such a policy is already a part of Parks Department regulations.

During 1965, the Bird Department continued to reduce its collection in anticipation of the eventual construction of the proposed World of Birds building. Thus, despite breeding records, the Zoo's collection is smaller in this area. A breakdown is given below:

# ZOOLOGICAL PARK COMBINED CENSUS December 31, 1965

	Species & Subspecies	Specimens
Mammals	193	696
Birds	545	1,565
Amphibians and Reptiles	256	639
Totals	994	2,900

A cooperative educational-research program with Cornell University was among the year's most successful innovations. Supervised by the curators, six Cornell students worked half time on special research and half time as keepers in animal departments during the summer. It is hoped that Federal support may eventually be found for this program.

In September, a new employee's handbook, prepared largely by Mr. John McKew, was published. The new book incorporates a number of innovations.

Research at the Zoo was spurred by the collaboration of the Zoological Society with Rockefeller University in the creation of the Institute for Research in Animal Behavior under the leadership of Dr. Donald Griffin, with a laboratory at the Zoological Park, a promising development for the further utilization of the Zoo's collections. As 1965 drew to a close, plans were complete for remodeling a sizeable building at the former Farm-in-the-Zoo for some of the Institute's work. Meanwhile, a major study of python metabolism continues at the Reptile House and various, if small, curatorial and cooperative projects continue in other departments.

The Zoological Park showered thoroughly in reflected glory on September 21 when General Curator Emeritus Crandall received the first gold medal of the American Association of Zoological Parks and Aquariums and the American Institute of Park Executives for his distinguished achievements. The medal was presented by Mrs. Lyndon B. Johnson.

There were important staff changes during the year. Herbert F. Schiemann, Society Comptroller for nearly 20 years, retired on August 1. Mr. Schiemann's competent watch on Zoo Park fiscal matters and his considered advice have been a much-valued aid to Dr. Tee-Van and to the present Director. Mr. Schiemann is succeeded by Mr. Walter Lerchenfeld, his understudy since 1960. On August 23, Mr. John L. Miller, who comes to us by way of the National Broadcasting Company and the New York World-Telegram & Sun, became Associate Curator of Publications. Mr. Hugh B. House, formerly an Assistant Director of the Jackson Hole Wildlife Research Station became Assistant Curator of Mammals on March 8.

Ancillary posts and activities of the Director during 1965 include designation as President-elect of the American Association of Zoological Parks and Aquariums and as President of the Wild Animal Propagation Trust. Mr. Conway continued to serve as a member of the Advisory Committee of the International Zoo Yearbook and as a member of the Survival Service Commission. He presented four papers on various aspects of the zoo's role in conservation at conferences in Colorado Springs and in Milwaukee and wrote various articles which are listed in the report of the Bird Department.

#### SUMMARY OF ATTENDANCE

Month	1964	1965
January	46,904	23,567
February	57,957	71,127
March	133,474	116,357
April	238,329	292,479
May	329,945	443,552
June	251,316	335,306
July	317,444	374,919
August	359,885	366,165
September	208,303	223,623
October	165,453	180,711
November	173,251	92,045
December	25,851	39,212
	2,308,112	2,559,063

The total number of visitors at the Zoological Park between its opening on November 9, 1899, and December 31, 1965, was 144,284,566.

# DEPARTMENT OF MAMMALS

Joseph A. Davis, Jr., Curator
Grace Davall, Assistant Curator
Hugh B. House, Assistant Curator
Joseph Ruf, Head Keeper

LEE S. CRANDALL, General Curator Emeritus

THE MAMMAL COLLECTION at the year's end numbered 696 specimens, representing 193 species and subspecies of 50 families and 12 orders. The collection as a whole has changed little in a year but has seen an increase in the size of most of our herds of threatened species, a decrease in the rodents and better representation of two of the "lesser" orders, the marsupials and the bats. The Small Mammal House contains the finest collection of rare and little-known species in many years.

As our duty to maintain larger breeding herds of endangered species is met, the demands made upon the department's personnel increase. Over the past years a subtle change in our management techniques has been required. Where once it was acceptable for a keeper merely to see that his animals were kept clean and in good health, proper management today requires that he be familiar with the behavior of all our animals on a day-to-day basis. This policy becomes increasingly difficult to maintain with our present keeper force operating as it now does beyond its practical capacity in some areas. To increase our supervisory capacity, an additional staff position, Assistant Curator, was created, and the post was filled on March 8, 1965, by Hugh B. House.

Of the major building projects that involve the Mammal Department, one, the "World of Darkness," began construction during the year. "African Forest West", the moated exhibit that replaces half of the old Kangaroo House yards, was planted in the spring and despite a dry summer began to assume its "tropical" look. Construction of a new "Wolf Wood" neared completion by the end of the year, and a striking new habitat exhibit for the Mandrills was completed by early summer at the Monkey House.

#### THE COLLECTION

In spite of what seems on the surface to be relative stability, the collection has undergone considerable change, not all of it intentional. A net gain of 30 specimens and a net loss of two forms finds our herds of threatened species in still greater strength and the collection, in general, more representative of the class Mammalia than in 1964. We have added species of marsupials and bats, two orders poorly represented in zoological parks as a rule. Serious losses in monkeys and deer resulted from efforts to halt what appeared to be an outbreak of tuberculosis in the Monkey House and to eliminate an endemic tuberculosis infection present in certain of the deer herds for many years. Among the monkeys which showed positive reaction to the tuberculin test was a magnificent adult male Humboldt's Woolly Monkey. Three species, Barasingha, Sambar and Chinese Water Deer were sacrificed in the program to eliminate the disease on the deer ranges.

Four species of marsupials, impossible to obtain under ordinary circumstances, were added to the collection, two for the first time. A male Striped Possum (Dactylopsila trivirgata melampus) collected in New Guinea by Dr. Jared Diamond is one of the most handsome and rarest of mammals in collections. Dr. Diamond's gift was greatly appreciated, as was another gift of three Sugar Gliders (Petaurus breviceps) from Dr. Theodore Schultze-Westrum of West Germany. (Again this year we are indebted to Mr. Hobart M. Van Deusen of the American Museum of Natural History for his continuing efforts to obtain such Australasian species for us.). Only two Yapoks (Chironectes minimus), the unique aquatic marsupial, seem ever to have been kept in captivity before, both apparently here. A pair was acquired by purchase, as was a trio of another rare species, the Coligrueso or Mink-opossum (Lutreolina crassicaudata). În preparation for the coming "World of Darkness" we have been adding to our experience with bats. Dr. Donald Griffin obtained for us a pair of Leaf-nosed Bats (Phyllostomus hastatus) and a pair of False Vampires (Vampyrum spectrum). The latter produced a baby one day after arrival and reared it to weaning age. By special permit from the U.S. Fish and Wildlife Service we obtained four Flying Foxes (Pteropus giganteus), a bat prohibited in this country for over sixty years.

After three years we succeeded in finding an African Bush Elephant to replace our old cow, Sudana, who died in 1962. The female calf, named Toto, weighed 1,006 lbs. on arrival. Training an elephant is an exacting, time consuming task, and none of our older animals is trained beyond obedience to the most basic commands. With a

view to gaining a better rapport with Toto, Floyd Smith, veteran elephant trainer at the St. Louis Zoo, was engaged to instruct the Elephant House keepers in the finer points of training. The undertaking was successful, and by the end of the year Toto already had a basic repertoire making her easy to work with, thanks to the efforts

of Senior Keeper William Souhrada and his associates.

Breeding pairs of gorillas in captivity are rare. The most promising approach to the breeding problem seems to be the rearing of a group of the apes rather than just a pair. With this in mind, we purchased two male and two female Lowland Gorillas, all about two years of age, in April. A third pair will be delivered in spring 1966, giving us a group of six, which, we hope, will grow into adults with more natural behavior patterns. By the end of the year the four youngsters are growing rapidly and are active and healthy. To make room for the gorillas it was necessary to sell our two adult Orang-utans, Andy and Sandra, to the Hanover Zoo in Germany. Although the two Orangs were a popular exhibit, they had formed abnormal breeding habits and had little prospect of producing young. Our responsibility to maintain breeding apes made the move necessary.

So many other notable species arrived during the year that a brief list must suffice: three Hispaniolan Solenodons from Drs. E. Gould and J. Eisenberg; four Demidoff's Galagos and three Angwantibos (the first seen in this country) from Mr. Robert Bateman; a pair of Small-toothed Palm Civets from the San Diego Zoo; two Tree Shrews and five Pouched Rats from the Zurich Zoo, and a female Pallid Fox

from the Milwaukee Zoo.

An Equatorial Genet collected in 1949 by Charles Cordier died after 16 years, 3 months in the collection, a record longevity for the species. Our Brazilian Giant Otter, in the collection 10 years and 10 months at the end of the year, has long since set a longevity record for the species and continues to do well.

# THE BREEDING PROGRAM

Of 126 viable young born during the year, 81 were members of the Artiodactyla, the order which contains the majority of endangered species. Table I shows the breeding record for six species in the past two years.

TABLE I

	Young born in 1964	Young born in 1965
Blesbok	5	5
Gemsbok	4	5
Jackson's Hartebeest	0	3
Thomson's Gazelle		6
Nyala	7	7
Large Malayan Chevrotain	6	9

The Chevrotain "herd" (they breed best when kept in pairs) numbered 19 on December 31 and has long since overflowed from the Small Mammal House to the basement of the Monkey House. In September the New York Zoological Park was given the Edward H. Bean Rare Mammal Breeding Award of the American Association of Zoological Parks and Aquariums for its success with the breeding of this species. (The animals, earlier identified as Small Malayan Chevrotains, *Tragulus javanicus*, have now been correctly ascertained to belong to the large species, *T. napu*).

The antelope herds continue to grow, and with their increase a new problem has arisen—one of space. Self-replenishing herds require considerable outdoor room and, in some cases, heated shelters of adequate size, too. We will soon need additional space for these herds; the alternative is to reduce the herds in number, but in so doing we would reduce the likelihood of maintaining them for any length of time.

In 1965 only nine species of Artiodactyls were represented by single animals or groups of the same sex. Of these one is now on deposit at another zoo for breeding, three were offered to other zoos with their own herds but not accepted. Mates for two other single animals, the Takin and the Chestnut Duiker, should arrive in 1966. The remaining animals are all aged specimens still of interest as exhibits but too old to breed.

In November our female Gerenuk, the first and only one born in this country, was sent to the San Diego Zoo to be mated with their male, the only other Gerenuk in the United States. Senior Keeper Neil Dapolite accompanied the animal and saw it established safely in its new home.

A single Père David fawn was born to a young doe purchased last year from the Cleveland Zoo. We are at a loss to explain the decline in breeding in the herd and close observation during the summer by one of our Cornell students (see Research) failed to disclose any real clue. Further investigation of the herd continues. The Formosan Sika Deer was put on the IUCN Endangered List in 1965; apparently no wild herds exist any longer on Formosa. Our herd, one of our most prolific forms, numbers 14 vigorous, mostly young animals.

# PHYSICAL IMPROVEMENTS

Two impressive new exhibits were created by modifying existing ones. The Mandrill enclosure in the Monkey House was transformed from a barren cubicle into a realistic fibreglas reproduction of tropical forest with boulders and buttress-rooted trees encrusted with lichen growths. The Mandrill group was chosen because they are

among the most destructive of our monkeys, but in six months of use they have not damaged it at all and can be seen in a handsome realistic setting. Elsewhere in the Monkey House extensive installations of natural limbs were added to many enclosures. One cage in the Lion House had its wire front replaced with a tempered glass panel, a change that allows an unrestricted view of our magnificent pair of leopards.

#### RESEARCH

The summer months saw the first of a planned series of annual inservice undergraduate research programs sponsored by the New York Zoological Society and Cornell University. Two students, Matthew Greenstone and Paul Jensen, undertook behavioral studies of young Lowland Gorillas and of the Père David Deer herd, respectively. Their studies contributed to our knowledge of the two species, and their presence helped to relieve the manpower problem. The department also cooperated with other institutions in various research endeavors.

Mr. Davis' investigations of otter behavior and taxonomy continued, involving studies at the Cincinnati Zoo and at the Smithsonian Institution.

#### OTHER ACTIVITIES

Messrs. Davis and House attended the annual conference of the AAZPA in Milwaukee and also visited the zoos in Chicago.

#### PUBLICATIONS AND PAPERS

#### Mr. Davis

"Mammals of the World" (review). Animal Kingdom, Vol. 68, No. 1, 1965. "The Fine Art of 'Greeting' Tigers." Animal Kingdom, Vol. 68, No. 2, 1965.

"It's a Great Year for Rarities." Animal Kingdom, Vol. 68, No. 5, 1965.

"Little Known Mammals." Nelson Doubleday & Co.

"Monkeys & Apes." Nelson Doubleday & Co.

"Zoos. Living History of the World." 1966 Year Book, Parents Magazine Press (in press).

#### MR. CRANDALL

"Feeding the Platypus (Ornithorhynchus anatinus) in Captivity." International Zoo Yearbook, Vol. VI, 1965.

#### SUMMARY

The collection increased slightly during the year, through breeding and the acquisition of a number of rarely-seen species. A new program of summer research began.

# Forms New to the Collection, Acquired in 1965

Mink Opossum—Lutreolina crassicaudata (Desmarest)
New Guinea Striped Phalanger—Dactylopsila trivirgata melampus Thomas
Golden Potto—Arctocebus calabarensis calabarensis (Smith)
Talapoin Monkey—Cercopithecus talapoin (Schreber)
Celebes Crested Ape—Cynopithecus niger Desmarest
Variegated Squirrel—Sciurus variegatoides dorsalis Gray
Pale Fox—Vulpes pallidus (Ruppell)
Small-toothed Palm Civet—Arctogalidia trivirgata stigmatica (Temminck)
Maxwell's Duiker—Cephalophus maxwellii (Hamilton Smith)

# Census of Mammals December 31, 1965

Orders	F	amilies	Species & Subspecies	Specimens
Marsupialia	Kangaroos, Phalangers,			
	Opossums, etc	3	9	19
Insectivora	Moles, Shrews,			
	Hedgehogs, etc	3	4	16
Chiroptera	Bats	2	4	10
PRIMATES	Apes, Monkeys, Lemurs,			
	Marmosets, etc	7	40	95
EDENTATA	Armadillos, Sloths,			
	Anteaters	3	4	6
Rodentia	Squirrels, Beavers, Mice,			
	Porcupines, etc	11	32	134
Carnivora	Bears, Raccoons, Cats,			
	Dogs, Otters, etc	7	44	105
PINNIPEDIA	Seals, Sea Lions, Walruses	2	4	4
TUBULIDENTATA	Aardvarks	1	1	1
Proboscidea	Elephants	1	3	4
Perissodactyla	Horses, Tapirs,			
	Rhinoceroses	3	6	11
ARTIODACTYLA	Cattle, Sheep, Antelopes, Camels, Giraffes, Deer,			
	Swine, Hippopotamuses	7	42	291
	Totals:	50	193	696

Summary: Orders, 12; Families, 50; Species & Subspecies, 193; Specimens, 696.

## DEPARTMENT OF BIRDS

WILLIAM G. CONWAY, Curator

JOSEPH BELL, Assistant Curator

GRACE DAVALL, Assistant Curator

ANDREW WINNEGAR, Head Keeper

LEE S. CRANDALL, General Curator Emeritus

The society's bird collection numbered 1,565 specimens of 545 species and subspecies on December 31, 1965. Twenty-two orders were represented. A large segment of the collection is now made up of hardy species that do not require special heated quarters during the winter months. Almost one-third of the present census are waterfowl in this category. Indeed our Anseriformes count is the highest it has ever been in the Zoological Park's history—106 forms, including 493 specimens of ducks, geese and swans.

#### THE COLLECTION

Stabilization has been the keynote of our collection management during 1965. New specimens had to be chosen with great care, for prime exhibit space is now at a premium and we are reluctant to overcrowd the carefully planned and planted habitat scenes in the Aquatic Birds Building. Very little in the way of stock replenishment has been needed in the new building. In fact, due to successful breedings in these exhibits, surplus birds were exchanged with several other zoos during the year.

Although plans for the proposed World of Birds have not progressed as rapidly as hoped, we have continued our policy of nonreplacement of species in this area. The Passeriformes count reflects this policy with a drop of over 100 specimens in the last two years.

Acquisitions for the year that deserve particular mention were five Rockhopper Penguins, two Black Herons, two pairs of Lesser Kelp Geese, two pairs of Bronze-winged Ducks and one pair of Blackheaded Ducks. By far the most important addition was a large group of Tufted Puffins collected for us last summer on an island off the coast of Vancouver. Seventeen of these birds and three Pigeon Guillemots, collected at the same time, are on exhibit in the Sea Cliffs at

the new Aquatic Birds Building. This is the only major exhibit of this family of northern sea birds in the world. A Congo Peacock (received in 1949) and a White-necked Picathartes (received in 1959) were the most notable losses.

# Forms New to the Collection Acquired in 1965

Black Heron—Melanophoyx ardesiaca (Wagler)
Lesser Kelp Goose—Chloephaga hybrida hybrida (Molina)
Bronze-winged Duck—Anas specularis King
New Zealand Scaup—Aythya novae-seelandiae (Gmelin)
Black-headed Duck—Heteronetta atricapilla (Merrem)
Pigeon Guillemot—Cepphus columba columba Pallas
Tufted Puffin—Lunda cirrhata (Pallas)
Lesser Violet-eared Hummingbird—Colibri thalassinus cyanotus (Bourcier)
Dumeril's Hummingbird—Amazilia amazilia dumerilii (Lesson)
Riverine Emerald Hummingbird—Amazilia fimbriata fluviatilis (Gould)
Estella's Hill Star—Oreotrochilus estella (d'Orbigny and Lafresnaye)
Lafresnay's Hummingbird—Lafresnaya lafresnayi saiil (DeLattre and Bourcier)
Bronzy Inca—Coeligena coeligena columbiana (Elliot)

#### THE BREEDING PROGRAM

The most rewarding aspect of the 1965 breeding program was the opportunity of watching at close quarters the courtship, nesting and rearing accomplished by a number of species in the habitat displays of the Aquatic Birds Building. Inca Terns could be observed carrying food to fat chicks, hidden in the crevices of the Sea Cliffs. In The Shore, the behavior of Kittlitz's Sandplovers was intensively studied and photographed as the birds concealed their eggs and defended and reared their chicks in front of an admiring public. Sun-bitterns, nesting in The Swamp, reared their strikingly-patterned offspring not 10 feet from the exhibit's front railing. Conditions were ideal for collecting data on these interesting events and, in all, 32 chicks of six species were reared in the new building during the year. Two of these species, Kittlitz's Sandplover and the African Spur-winged Plover, had apparently not been bred in captivity before. A pair of Boatbilled Herons and a pair of White-collared Kingfishers also nested but in both cases the young did not survive. The Department's "Egg Log" recorded a total of 1,188 eggs laid in the collection during the year. Other species of note among the birds reared were Black-necked Stilt, Oriental Pratincole, Cattle Egret and Sharp-winged Teal. Three American Eiders were the first of this species to be reared from our own stock. The parent birds were hatched from eggs sent to us from Iceland.

#### PHYSICAL IMPROVEMENTS

After 15 years of operation, the Penguin House was closed early in the year for general repairs and painting. The aquarium glass fronting the exhibit, scarred by years of hard wear, was replaced and the worn surface of the deck and pool was covered with a smooth, clean coating of fiberglass. The building was reopened in May. Many small adjustments and modifications were made at the new Aquatic Birds Building this year but the most important new feature is a brooder room—a series of waterfowl rearing pens constructed by our own zoo technicians. Located in a large basement room designed for the purpose and named "Winnegar's Wing-Ding", for attentive Headkeeper Winnegar, each small enclosure has its own pool and adjustable heating device—an ideal facility for rearing waterfowl of varied types and diverse age groups. Another project undertaken by park forces was the renovation of the old bird yards bordering the east side of the Ostrich House. A new look has been given to this area with moats, low fences, streams and pools, and visitors pass through on a slightly elevated pathway appropriately called "Crane Walk". The exhibit features bustards, secretary birds and cassowaries as well as cranes. During the breeding season, young ducks and geese make their public debut here before being introduced to the larger wildfowl ponds.

### RESEARCH

As in previous years, shortage of staff and the mounting duties of better maintaining the large collection with many new habitat displays left little time for initiating significant new reasearch. Some work on special research projects was carried on this year, however, with the newly established in-service trainee program sponsored jointly by the Zoological Society and Cornell University. Two Cornell students spent their summer working as part-time keepers and as student researchers in the Bird Department. Under the supervision of the curators, data was collected in several fields. One student spent his research time observing courtship display and breeding behavior in groups of birds at the Aquatic Birds Building. Egg weight loss during incubation, clutch replacement and chick development were studied by the other research student. In a cooperative research project, the Bird Department provided space, birds and special handling for visual response studies conducted by Dr. Edward S. Tauber of Yeshiva University. Particular attention was paid to the eye movement patterns of predatory species. The Department also cooperated in the research programs of many other institutions.

#### PUBLICATIONS

#### MR. CONWAY:

- "Availability and Long-Term Supply of Primates for Medical Research: a Report on Conference Sponsored by the New York Zoological Society and the International Union for the Conservation of Nature and Natural Resources." *International Zoo Yearbook*, Vol. VI, 000-000.
- "Exhibit for Waterbirds at New York Zoo." International Zoo Yearbook, Vol. VI, 000-000.
- "Counting Elephant Seals on Punta Norte." Animal Kingdom, Vol. LXVIII (1), 2-12.
- "Apartment Building and Cliff Dwelling Parrots." Animal Kingdom, Vol. LXVIII (2), 40-46.
- "The Penquin Metropolis of Punta Tombo." Animal Kingdom, Vol. LXVIII (4), 115-123.
- "A Close Look at Argentine Wildlife." Animal Kingdom, Vol. LXVIII (5), 134-140.
- "New Home for Waterbirds of the World." Parks and Recreation, Vol. XLVIII (11), 644-645.
- "New York Zoological Park Avicultural News." Avicultural Magazine, Vol. LXXI, 191-192.

#### SUMMARY

The Society's waterfowl collection is at an all-time high. New features are a waterfowl rearing laboratory and an exhibit for cranes and other large terrestial forms of bird life. The breeding program resulted in the rearing of several species bred in captivity for the first time. Research was limited but a cooperative in-trainee program sponsored by the Society and Cornell University spearheaded a new era of educational cooperation and research in the Zoological Park.

## Census of Birds December 31, 1965

			Species &	7
Orders		Families	Subspecies	Specimens
SPHENISCIFORMES	Penguins		7	25
STRUTHIONIFORMES	Ostriches	. 1	1	6
CASUARIIFORMES	Cassowaries and Emus		3	4
TINAMIFORMES	Tinamous	. 1	3	12
PELECANIFORMES	Pelicans, Cormorants, etc.	. 4	9	23
CICONIIFORMES	Herons, Ibises, Storks, etc.	. 5	31	95
PHOENICOPTERIFORMES	Flamingos	. 1	6	58
ANSERIFORMES	Swans, Ducks, Geese and	1		
	Screamers		106	493
FALCONIFORMES	Vultures, Hawks and			
	Eagles	. 4	29	41
GALLIFORMES	Quail, Phesants, etc	. 4	30	80
GRUIFORMES	Hemipodes, Cranes,			
	Trumpeters, etc	. 6	30	91
CHARADRIIFORMES	Plovers, Sandpipers, Gulls	,		
	etc		48	210
COLUMBIFORMES	Pigeons, Doves and			
	Sandgrouse	. 2	20	43
PSITTACIFORMES	Parrots, etc	. 1	10	24
CUCULIFORMES	Touracos and Cuckoos .	. 1	4	4
STRIGIFORMES	Owls	. 1	13	24
CAPRIMULGIFORMES	Frogmouths, Nighthawks	,		
	etc		2	3
APODIFORMES	Hummingbirds		9	12
TROGONIFORMES	Trogons and Quetzals		1	1
CORACHFORMES	Kingfishers, Hornbills,			
	etc	. 4	16	32
PICIFORMES	Barbets, Toucans and			
• *	Woodpeckers	. 3	12	18
Passeriformes	Perching Birds		155	266
	G	82	545	1.565

Summary: Orders 22; Families, 82; Species & Subspecies, 545; Specimens, 1,565.

## DEPARTMENT OF REPTILES

HERNDON G. DOWLING, Curator STEPHEN SPENCOOK, Head Keeper

The collection numbered 639 specimens of 256 species and subspecies of amphibians and reptiles at the end of 1965. These are very nearly the same numbers (750-246) that appeared on the 1964 census and represent about the maximum number of animals that can be adequately housed and cared for in the Reptile House, a structure built in 1899 and largely remodeled in 1953. Because our space is small for a major collection, we have dropped behind several other collections in numbers of species and individuals. However, there are still no other collections that present the combination of rarity and exhibition technique that distinguishes ours.

#### THE COLLECTION

Of the 584 amphibians and reptiles that were acquired this year, 441 were received as gifts, 54 were born or hatched here, 69 were

purchased and 20 were received on exchange.

Only a few of the specimens received by gift or exchange were of special interest. The three baby Anacondas (Eunectes murinus) born in the National Zoological Gardens should be mentioned in this regard. The Staten Island Zoo donated four Red Diamond Rattlesnakes and the American Museum of Natural History, as usual, provided a number of interesting reptiles and amphibians. Through the efforts of Keeper Peter Brazaitis, a rare Dwarf Caiman was obtained by exchange from the Catskill Game Farm.

One item of great interest was a change in our policy of accepting every reptile that was offered as a gift. Recent public interest in reptiles as pets had expanded the gift problem from the minor "public service" of receiving a few unwanted turtles to a major problem of care, record keeping and space for more than 500 unwanted gifts that appear annually. Further, there was the fear that some of these unwanted animals might introduce a disease into the permanent collection and thus cause very serious damage. This decision (made in October) reduced the gifts of turtles from an average of 29 per month, for the first nine months of the year, to 10 per month for the remainder of the year. A large proportion of the latter were turtles that were desired by the Department.

Five African Leopard Tortoises were purchased in a continuing effort to improve our collection of these animals. Two African Mambas, a Western Green and a Black, were purchased to amplify our fine collection of the dangerously venomous snakes of the world. They have been housed in an enclosure with a fog-spray water nozzle and a special water-absorbent baked-clay substratum to see if the higher humidity thus provided will improve longevity of the snakes in the Reptile House.

Perhaps the most interesting purchase was a group of three species of the rear-fanged watersnakes of Southeast Asia (Homolopsinae). One of these, the Tentacled Snake, with queer, flap-like snout structures, is one of the strangest looking snakes in the world. After an absence of three or four years, Australian reptiles made a sudden appearance on the market and we purchased several, including Snakenecked Turtles, Australian Water Dragons, Giant Skinks and four Carpet Pythons.

The King Cobras first raised and then dashed our hopes of repeating the successful breeding of 1957. A young female purchased last year mated with one of the males on April 12 and laid 24 eggs on May 17. Unfortunately, only five of the eggs were fertile and the single youngster that hatched in August died shortly thereafter. To complete the dismal report, one of the male snakes apparently decided that the female would make a better meal than a mate and injured her fatally in September.

The research on pythons was dealt a serve blow when amebiasis appeared in our African Pythons (hatched here in 1960) and in the more recently obtained group of Blood Pythons. However, three Blood Pythons were hatched from a clutch of eggs laid before the disease became evident and are still living at the end of the year. In addition, a Burmese Python incubated a clutch of infertile eggs during February and March resulting in no baby pythons but mountains of data on python brooding metabolism.

Fifty-seven reptiles of 14 species were donated to the Atlanta Zoo in preparation for their opening of a new Reptile House.

## RESEARCH AND OTHER ACTIVITIES

Research on the reptile collection became a major item during the summer of this year. Undergraduates Steven Schuchman and John Frazier of Cornell studied temperature regulation in large lizards and the behavior of tortoises on the Society's work-research program. Graduates Judy Osborn and Allen Vinegar studied reptilian respiratory metabolism in the new Reptile House laboratories. Mr. Vinegar was appointed a Visiting Research Fellow in recognition of his continuing work at the Park. He expects to continue his research on python metabolism here for another year. Dr. Dowling received his second appointment as Adjunct Professor of Biology, this time at New York University. He holds the same post at the University of Rhode Island.

Much new and interesting information was gained from the young female Burmese Python (Python molurus bivittatus) that laid a clutch of infertile eggs in February and brooded them in a metabolism chamber for more than a month. This is the first time that precise measurements of temperature, oxygen consumption and carbon dioxide production have been made of a brooding snake. A paper on these unusual observations has been prepared for publication in Science and should appear early in 1966.

Curator Dowling and Visiting Research Fellow Vinegar presented papers on reptilian temperature control and metabolism at a New York University biology seminar and, with Dr. Victor H. Hutchison, Research Associate in Herpetology, presented another at the annual metting of the American Society of Ichthyologists and Herpetologists in Lawrence, Kansas. Dr. Dowling also spoke at meetings at the Animal Medical Center, New York, the New York Herpetological Society, the Biological-Medical Society of Brooklyn College, the Linnaean Society of New York and the meetings of American Association for the Advancement of Science in Berkeley, California.

## CURRENT LONGEVITY RECORDS-1965

Species Arriv	ved in Park
Albemarle Giant Tortoise, Geochelone e. elephantopus (Harlan)	
(At Crandon Park, 1957-1962)	1928
Duncan Saddleback Tortoise, Geochelone elephantopus ephippium	
(Guenther)	1928
Indian Gavial, Gavalis gangeticus (Gmelin)	1946
Three-toed Boxturtle, Terrapene carolina triunguis (Agassiz)	1949
American Alligator, Alligator mississipiensis (Daudin)	1950
American Alligator, Alligator mississipiensis (Daudin)	1951
King Cobra, Ophiophagus hannah (Cantor)	1953
Star Tortoise, Geochelone elegans (Schoepff)	1954
Burmese Python, Python molurus bivittatus Schlegel	1954
Giant Sideneck Turtle, Podocnemis expansa Schweigger	1955
Brown Sandboa, Eryx johnii (Russell)	1955
Flathead Sideneck, Platemys platycephala (Schneider)	1955
Hybrid Asiatic Cobra, Naja naja kaouthia x N. n. naja	1955

#### **PUBLICATIONS**

#### Dr. Dowling:

A Tangle of Serpents. Animal Kingdom, Vol. 68, No. 1: 18-21.

Our Crocodilians Like It Hot. Animal Kingdom, Vol. 68, No. 3: 74-78.

Boa Constrictor: From Tropical Menace to Popular Pet. Animal Kingdom, Vol. 68, No. 6: 183-185.

Caribbean Puzzles. Animals, Vol. 7, No. 18: 478-481.

#### MR. VINEGAR:

Pulmonary and Cutaneous Gas Exchange in the Green Frog, *Rana* clamitans. *Zoologica*, Vol. 50, No. 1: 47-54 (with Victor H. Hutchison).

## CENSUS OF AMPHIBIANS AND REPTILES

## December 31, 1965

		Speci	ies &	
Orders	Амрнівіа	Subsp	pecies	Specimens
CAUDATA	Salamanders		11	25
SALIENTIA	Frogs and Toads	• • •	10	27
	REPTILIA			
TESTUDINES	Turtles		82	232
CROCODYLIA	Alligators and Crocodiles		13	46
SQUAMATA				
Sauria	Lizards		31	72
SERPENTES	Snakes		109	237
Summary: Orders 5; S	Species, 256; Specimens, 639.			

## ANIMAL HOSPITAL

CHARLES P. GANDAL, Veterinarian

THE HIGHLIGHT OF the year was the arrival on April 6 of four baby gorillas. Their two-month quarantine and acclimatization period in the Hospital was a busy time for all. Details of the gorillas stay have been recorded in Animal Kingdom, but it should be reported here that the four babies presented a tremendous challenge. Their excellent response was a most rewarding experience to all concerned. Among the important factors contributing to our success were proper renovation, preparation and steam sterilization of the cages prior to their arrival, close attention to diet and dietary changes as needed, continuing parasite examinations and vermifuge treatment, tuberculosis testing, isolation from human contact (except for specified individuals), prompt treatment of minor ailments and much "T.L.C." Hospital Keeper Gus Waltz deserves a great deal of credit for the success achieved with these babies. It is hard to realize how much time had to be spent with four young animals of this sort in order to insure their happiness and well being. Yet without this continual and understanding human association, the stress of sudden environmental changes might well have resulted in serious behavioral or secondary disease problems.

We have always followed extremely rigid quarantine and testing procedures for all primate accessions, and the value of this program was pointed out when an apparently healthy young Spot-nosed Monkey, which had been purchased, showed up positive on a tuberculosis test immediately after arrival. On the advice of the dealer, the animal was euthanized and autopsy examination revealed tubercular lesions. This case certainly strengthened our convictions regarding the value of stringent and quarantine procedures at the Zoological Park.

## TUBERCULIN TESTS FOR PRIMATES

In December, our two Silvered Leaf Monkeys suffered a recurrent eye infection and were brought to the Hospital. As has been customary with such cases, they were routinely tuberculin tested, and we were quite upset when both monkeys revealed positive tests. The animals were euthanized and one showed active tubercular lesions, the first such case in our primate collection in over 20 years. Following this, 80 monkeys in the Primate House were tuberculin tested, and no further cases of tuberculosis were found. Our vigilance in testing and the rapid action following the initial case are responsible for preventing any further spread throughout the primate collection.

#### DEER HERDS

Tuberculosis is a problem which confronts all zoos and this year we were determined to initiate a program of tuberculosis eradication in our deer herds. The Barasingha herd, which has done poorly in recent years, was the main offender and all associated species in that barn grouping were also tested. Following the testing, four Barasingha, four Chinese Water Deer and one Sambar Deer were euthanized, the barn and paddock areas steam cleaned and disinfected and the quarters vacated. In addition, water drainage and rain washing areas were eliminated to prevent any future contamination from corral to corral. We were fortunate in having the excellent cooperation of the United States Department of Agriculture in our deer tuberculin testing program.

## Use of Capture Gun

We continued to make excellent use of the injection gun apparatus, utilizing it on a wide variety of animals. A female Blesbok was immobilized after suffering an acute lameness of the hind leg. Following x-ray, luxation of the tibiotarsus was diagnosed, a most unusual condition which fortunately was readily remedied. A female Nyala incurred a typical zoo injury; the lower lip was torn away from its attachment when she ran into a wire fence. She was immobilized using the gun and the attachment of the lip sutured. A full recovery ensued. In handling the larger primates and anthropoids the gun is particularly helpful, especially in conjunction with an experimental drug, phencyclidine. This combination was utilized to facilitate the crating of our Orang-utans, "Andy" and "Sandra," when they were shipped to the Hanover Zoo and to immobilize "Jimmy," our large Chimpanzee, for tuberculin testing. The injection gun was also utilized for administering therapeutic medication to our young African Elephant, "Toto," for an infected gum at the time her tusk was erupting.

## Parasite Problems

Some interesting parasite problems were presented in mammals, including a severe whipworm infestation in a Camel that responded well to dithiazinine iodide therapy after several other medications had proved of no value, a balantidium infection in our mature gorillas which responded well to tetracycline therapy, the recurrence of a

parasite problem in our White Rhinos, just as in 1964, shortly after a mud wallow was instituted, and the finding of over 7,000 liver flukes in a deceased Howler Monkey, which was examined by Dr. Robert Stabler of Colorado College.

## Use of Methoxyflurane

The use of Methoxyflurane, a relatively new anesthetic, has proven of great value for short term procedures in most all avian species. It is simple to administer, rapid in action and much safer than ether. Methoxyflurane also makes an ideal supplementary anesthetic to be utilized with Equithesin, and we are investigating the possibility of utilizing a gas anesthesia machine which would be satisfactory for mammals, birds and reptiles.

The treatment of snakes has always been a most challenging and often frustrating affair. In 1965, we initiated studies of Methoxyflurane on reptiles and found it to be excellent and relatively safe, although much slower-acting in reptiles than in mammals and birds. The use of this anesthetic enabled us to perform surgery that was previously not considered practical. A malignant tumor weighing just under one pound was successfully removed from the jaw of our Indian Python, a 13-foot specimen. The surgery lasted nearly two hours and excellent anesthetic levels were supplied by Methoxyflurane, although its effective administration required a great deal of ingenuity due to the snake's very slow rate of respiration.

Another interesting surgical procedure facilitated by this anesthetic was the removal of an ectopic egg from the abdominal cavity of a Sand Boa. This snake had not eaten for three months prior to the operation. Ten days afterward, it started to eat and has been well ever since. A King Cobra was also anesthetized for suturing of extensive lacerations from a cage mate and an Asiatic Cobra was operated on for removal of cystic ovaries, which had produced an abdominal distention.

The Zoo medical facility was greatly helped this year by John M. Budinger, M.D., a newly-appointed Fellow of the Society. Dr. Budinger, who is Pathologist and Director of Laboratories at Lawrence Hospital in Bronxville, N.Y., has shown great interest and an acute sense of understanding regarding the problems confronting zoo animals. Through his kind cooperation and consultation many perplexing problems are being actively studied and some extremely valuable results have been forthcoming.

## COOPERATIVE RESEARCH

The veterinarian was appointed as a research collaborator at the

Brookhaven National Laboratory for work to be done with Dr. Edgar Tonna, head of the Histo-Cytochemical Research Division, on a microscopic and microradiographic survey of skeletal samples.

Twenty-nine avian blood samples were sent to Dr. Morris London, biochemist at North Shore Hospital, Manhasset, Long Island, for uric acid tests that might lead to early diagnostic criteria for visceral gout in birds, with subsequent treatment possibilities. In all, a total of 457 specimens were sent to 16 investigators.

## PAPERS AND PUBLICATIONS

## Papers presented were:

"The Zoo and Its Veterinary Service." Metropolitan Animal Care Meeting. "Zoo Medicine and Techniques." Cornell University, Veterinary Students Seminar.

"The Zoo Animals and Their Diseases and Treatment." Maine State Veterinary Association Meeting.

"Surgery of Parakeet Tumors." Mid-winter, Region 1, American Animal Hospital Association Meeting.

## Publications were:

"A New Trematode, Cathaemasia senegalensis, From the Saddle-bill Stork." Stunkard, Horace W. and Gandal, Charles P., Zoologica, Vol. 50, Issue 2, Summer 1965.

"Management of Dystocia in a Grant Zebra." Veterinary Medicine/Small Animal Clinician, Jan. 1965.

"Four Baby Gorillas-Four Personalities." Animal Kingdom, July-Aug. 1965.

## The veterinarian attended the following meetings:

Region 1, Mid-winter American Animal Hospital Association, Manchester, Vermont.

Marine Biology Workshop, Sandy Hook Marine Biological Laboratory, Sandy Hook, New Jersey.

Part 1 of 2-day Primate Conference on "The Availability and Long Term Supply of Primates for Medical Research," at the New York Zoological Park, sponsored by the New York Zoological Society and the International Union for Conservation of Nature and Natural Resources.

## FIRST AID AND LABORATORY STATISTICS

Vencenza Martine, R.N., our regular nurse, and Peggy Cahn, R.N., our weekend nurse, treated 1,383 first aid cases, of which 517 involved our own employees. Twenty-six members of the blood bank donated blood and 31 pints were given to nine recipients.

In November, a Reptile Keeper was bitten by a St. Lucia Viper and the veterinarian and nurse were fortunately on hand to render immediate and effective first aid treatment. The Hospital Laboratory recorded 562 specimens, including routine bacterial cultures, sensitivity tests, blood and urine tests and stool examinations. Of these, 454 involved mammals, 64 birds and 44 reptiles.

#### Animal Commissary

On June 29th, 1965, Walter Cavanagh assumed the duties of Animal Commissary storekeeper, replacing Richard Ryan who left to become director of the Turtle Back Zoo in Essex County, New Jersey.

In the Mortality Tables which follow, "Total in Collection" is arrived at by adding to the census at the beginning of the year all animals acquired by purchase, exchange, gift or born alive. Animals disposed of alive by sale or exchange during the year are not deducted. No acclimatization period following birth or arrival is allowed.

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# MORTALITY TABLE MAMMALS

	Total in Collection		
Year	Throughout the Year	Died	Mortality Percentage
1965	974	156	16.01
1964	857	134	15.63
1963	839	136	16.20
1962	808	202	25.00
1961	724	128	17.68
TOTALS:	4,202	756	
Av			
Av	17.22		

## BIRDS

	Total in Collection		
Year	Throughout the Year	Died	Mortality Percentage
1965	1991	270	13.56
1964	1866	331	17.59
1963	2012	334	16.60
1962	1890	385	20.36
1961	2339	437	18.68
TOTALS:	10,098	1,757	

## DEPARTMENT OF EDUCATION

HERBERT J. KNOBLOCH, Curator

MICHELE A. PERRAULT, Zoology Specialist

INGER B. BRADBURY, Assistant Zoology Instructor

ATTENDANCE RECORDS WERE SET at the Zoological Park during the year by school classes and other organized educational groups. This good news follows the report for the previous year when such visits were down, apparently as a result of the opening season of the New York World's Fair. The totals for the year, as compared with 1964, are:

	1964	1965
Schools, Organizations and Institutions	4,166	5,273
Classes and Organized Groups	6,418	8,429
Total Class/Group Attendance	224,065	274,941

May was again the best month of the year for attendance by school classes and educational groups. June was next. The figures, though not records, are, nevertheless, considerably higher than those of 1964.

	May	June
Schools, Organizations and Institutions	1,725	1,207
Classes and Organized Groups	3,109	2,238
Total Class/Group Attendance	88,012	60,808

Group attendance during the summer was up over recent years, the increase helped in part by visits to the Park by groups from Operation Headstart. Church and play schools, day camps and other organized groups visited in large numbers.

	July	August
Schools, Organizations and Institutions	854	625
Classes and Organized Groups	868	753
Total Class/Group Attendance	49,908	35,473

#### VISUAL AIDS

The department assisted in the production of four motion picture films. These were: "Zoo Short Stories;" The Sea on Show;" and "Expedition to a Puffin Island."

A large amount of footage was assembled and matched for a proposed film on African wildlife.

Moreland Latchford Productions, Ltd., of Toronto, Canada, selected about 800 feet of miscellaneous Society-owned footage for possible use in a series of short productions on game animals.

The department provided about 6,000 feet of film for the Canadian Broadcasting Corporation for a series of educational films they are producing called "The Nature of Things."

Some 13,000 feet of Argentine wildlife footage taken by Director Conway and Trustee Robert G. Goelet was turned over to Evan J. Anton Productions, Ltd., where work was begun by Mr. Anton on a 45-minute movie to be called "Destination Patagonia."

During the year we received 101 rental orders for Society films, and these were seen by 7,535 people. Staff officers used 90 films to illustrate lectures on 55 occasions. Audiences for these lectures totaled 4,624. A hundred films were shown to 13,412 persons at 107 special showings outside the Zoological Park. Excerpts from 16 of our films were used on television during the year.

#### GUIDED TOURS

The department conducted 112 guided tours of the park for 4,310 students.

## SCHOOL LECTURE SERVICE

Miss Perrault and Mrs. Bradbury gave 382 talks illustrated with live animals to 74,234 students at 186 schools. Well over half the lectures took place at public schools in New York City. All the figures represent new highs for the department.

## Animal Nursery

The Animal Nursery opened for the season on Saturday, April 17, and closed on Sunday, October 31. It was staffed by Miss Hanna Hinsch and Miss Linda Woghin.

#### PERSONNEL

Miss Perrault was given the title of Zoology Specialist in May.

## LECTURES

Department members gave 17 lectures during the year for audiences totaling 1,025. Miss Perrault and Mrs. Bradbury also participated in nine television programs, many of them taped and repeated two or more times.

## MISCELLANEOUS

The department played host for the ninth year in a row to visitors coming to the park via New Haven Railroad's special "Zoo Trains."

More than 2,500 persons made the trip on three spring Saturdays from points in New England.

For the 14th time, a 15-week natural history training course was given for Girl Scout leaders. It began on February 17 and ended on June 2.

During July and August, students in grades four through nine took part in nine zoology workshops.

Our 31st and 32nd in-service courses on the "Utilization of the Zoological Park in the Science Program of Elementary and Secondary Schools" were given to 43 teachers in the spring and to another group of 53 in the fall.

A two-day science and education seminar was held in August for a group of principals, science coordinators and teacher specialists in the New York City school system. The seminar was in conjunction with the 1965 National Science Foundation Summer Science Institute sponsored by the Bank Street College of Education.

Two natural history courses for junior high school students were conducted during the spring and fall. Each course consisted of eight Saturday morning sessions.

Ladislau Santiago, a young man chosen the best student in our fall course the previous year, was sponsored by the Society to a week at the De Bruce Conservation Camp, Livingston Manor, New York, for a special conservation training course.

## DEPARTMENT OF EXHIBITS

Jerry M. Johnson, Designer

HILE 1964 WAS A YEAR devoted to the creation of entirely new VV exhibits, 1965 was a year marked primarily by renovation. Several major exhibit areas were redesigned and the work on them completed during the year. Probably the single most important project at the Zoological Park was the work on the Mandrill cage in the Monkey House. This was the first attempt by any zoo to create a habitat setting from fiberglass for a large primate. The work resulted in the reproduction of a rain forest floor, complete with the great buttress roots of the giant cieber tree, vines, a strangler fig and rocks. Although there were many skeptics who doubted that the new materials could withstand the constant onslaught of seven active Mandrills, their doubts have since given way to general enthusiasm. The very fact that we were able to undertake so experimental a project reflects the current policies of the Zoological Society, that for a zoo to progress it must be encouraged to experiment and innovate. Without this, it becomes just another animal installation characterized chiefly by a monotonous similarity to a 100 other such establishments.

A second important project completed during 1965 was "Seal Island," a total renovation of the old tri-pool complex at the New York Aquarium. This was an attempt to create an exhibit which would be both visually stimulating and educational in concept. Visitors were to be afforded a visual cue as to the native habitat of the various marine mammals on exhibit. Walking around the "Island," one was to be confronted with different backdrops of snow, ice and rocky sea coast. The exhibit was completed and opened in August.

Other important department projects included the renovation of the Penguin House pool, the redesigning of the large oceanic tank at the Aquarium, the design and construction of a prairie dog exhibit for Time-Life Inc., to be used for an exhibit on animal behavior, and the development of a suitable Wolf exhibit.

In addition to these major projects the Department produced several graphic displays for the Park, including new signs for the Mandrill exhibit, European waterbirds, animals born in the Park, a new Bronx Zoo entrance sign and a number of signs and panels for the annual members' meeting at the New York Hilton Hotel.

The closing months of the year were devoted primarily to planning for 1966. Preliminary ideas, sketches and plans were being crystalized for the new World of Darkness building.

## MISCELLANEOUS ACTIVITIES

Mr. Johnson attended the annual AIPE conference in Milwaukee, where he gave a paper entitled: "Why a Department of Exhibition?" He subsequently visited the Brookfield and Lincoln Park Zoos in Chicago.

## CONSTRUCTION AND MAINTENANCE

CHARLES B. DRISCOLL, Superintendent of Operations
GEORGE RUSSELL, Assistant Superintendent of Construction
Louis Sanders, Assistant Superintendent of Maintenance

THE YEAR PAST saw this department work on a large number of important projects involving both new and reconstructed animal exhibits and other jobs aimed at providing improved services to the public.

Two major projects were the "Crane Walk" in the area east of the Ostrich House and the Mandrill cage of the Monkey House. The latter project involved changing a barren cage into "habitat" area depicting a scene typical of a tropical forest. The work included making trees and vines out of fiberglas and paint and the installation of special lighting fixtures.

"Crane Walk" called for the removal of old fences and the construction of a moated area with streams and pools, plantings and a winding, raised walk to provide visitors with close-up viewing of the birds.

Late in the year a substantial amount of the work was completed on a new, outdoor habitat for wolves to called "Wolf Wood." Located next to the Wisent range, it consists of an open, wooded area with underground dens behind a concealed water moat.

The two major projects not involving the animal collection were the construction of a small auditorium on the lower floor of the Heads and Horns Museum and the substantial renovation of the Flamingo Terrace restaurant. Work on the auditorium involved the installation of an acoustic tile ceiling, controlled lighting and sound equipment, and new walls, flooring and a stage. This project was substantially completed by the end of the year.

The restaurant job was a project designed to give that facility a more efficient plant. The work there involved the installation of new equipment for the preparation and handling of food, new plumbing and a complete paint job.

Some other important projects included:

Refurbishing the interior of the Penguin House.

Installing a special glass front for the Clouded Leopard exhibit at the Lion House.

Installing a new kitchen and adapting a cage for young gorillas, both at the Great Apes House.

Regrading the yards at the Elephant House.

Putting a new thatch on the roof of the Granary at the African Plains and installing ninety 30-foot poles at the entrance to the exhibit.

Installing new water mains to the Penguin House and Wild Fowl Pond and placing lightning rods at the Antelope House.

Making substantial bench and fence repairs outside the Park, east and west of the Bronx River.

Resurfacing the floors of the Antelope and Yak Houses.

Installing push-button drinking fountains in the ape exhibits. Building new brooders in the basement of the Aquatic Birds Building.

Laying some 3,000 yards of asphalt paving in the Park.

Painting the Elephant, Monkey and Small Mammal cages, restaurant chairs and tables, tractor trains and the Children's Zoo.

In addition to these projects, four moated enclosures were completed on the east side of the Kangaroo House. This job, built under the Department of Parks capital budget program, consisted of removing old fences and concrete coping, regarding, the installation and construction of a drainage system, new moat walls, streams, pools and landscaping. The area is to be known as "African Forest West."

Bids were opened in July for another capital budget project, the 'World of Darkness." The low bid was \$612,195, and work on the building got started late in the year.

The department carried out a large spring landscaping program that included the planting of 1,137 trees and shrubs, 1,575 vines, 79 tropical plants, 600 annuals and a new lawn at the Fountain Circle.

A new chemical, "Bidrin," was used for the first time in an effort to save 60 of the large elm trees in the Park. The insecticide is applied by injection into the bark to control the Elm Bark Beetle.

Finally, it should be noted that a tree identification program began in 1965. Several hundred labels giving the common and scientific names were placed on the proper trees along walks and pathways in the Park.

## FACILITIES DEPARTMENT

## Edward Kearney, Manager

EDWARD QUINN, Assistant Manager

I NCREASED ATTENDANCE IN THE PARK combined with more efficient operating procedures produced higher revenues in the facilities Department in 1965. It is this income, derived from restaurants, animal rides and the sale of souvenirs, that provides funds for the purchase of animals and general improvements in the Zoological Park. Net profits in 1965 came to \$252,600, up from \$166,000 of the previous year.

The most impressive change came in the operation of the Flamingo Terrace, a facility which underwent a great deal of renovation prior to its conversion from a cafeteria serving many varieties of hot dishes and sandwiches to a fast-moving snackbar dealing almost entirely in hamburgers, hotdogs, pie, ice cream, coffee and soft drinks. Thus, from a very modest investment, the Flamingo Terrace facility, which had shown a net operating loss of \$5,201.09 in 1964, produced a net profit of \$20,154.95 in 1965.

In general, it was a good year for our other restaurant and snack facilities and for the souvenir stands around the Park. Among the new items to go on sale to the public during the year were a series of 12 color postcards, including eight scenes from the Aquatic Birds Building.

#### PERSONNEL

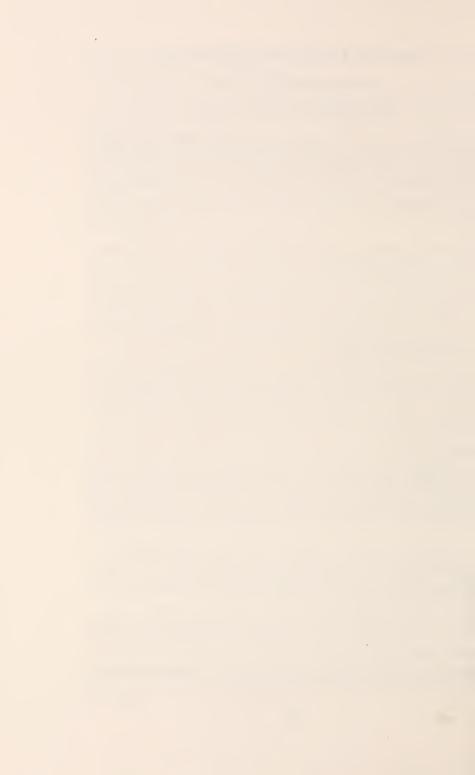
The department lost the skills of two Unit Managers, Steve Mahig and Roy Pickett, both of whom retired during the year. It was also a year that saw Miss Helen Miller, the department's Supervising Clerk, celebrate her 30th anniversary of employment with the Society.

## MISCELLANEOUS OPERATIONS AND SERVICES

CHILDREN'S Zoo. This facility completed its 25th year in operation with a gratifying increase in attendance over the previous year. The total admissions for 1965 were 317,424.

RIDING TRACK. 1965 showed a substantial increase in the number of rides. The total was over 325,000, up by over 30,000 rides from the previous year.

TIGER TRAINS. The Tiger Trains again gave over 30,000 rides during their operation from late spring to early fall.



## THE AQUARIUM

## REPORT OF THE DIRECTOR

PAUL L. MONTREUIL, Director

This was a year of much activity at the Aquarium. Construction of the Osborn Laboratories of Marine Sciences was started early in June. Details concerning the cornerstone laying ceremonies held on June 29, a momentous occasion in the history of the Society, are included in the President's report. In addition, reconstruction of the Oceanic Tank and the Tripool (now called Seal Island), two of our major installations, was completed. The decor for the Oceanic Tank and the design of Seal Island, which is divided into three simulated ecological areas with natural rock-ice background, is entirely the work of Jerry Johnson. The animals readily adapted to their new quarters, and these exhibits appear to be very popular with the visitors, especially during feeding time.

In spite of blizzards and storms in the early part of the year, the power failure and some poor weekend weather, attendance at the Aquarium increased by 12% over 1964. The attendance figure for the warm period of May through August showed a significant increase of more than 20% over the preceding year. The total annual attendance, however, was still 2.6% less than in 1963. The relatively low attendance in 1964 can most likely be attributed to the general public unrest prevalent in the City, in Coney Island especially, and not, we believe, to "competition" from the World's Fair, as had been suggested.

Although Coney Island was one area not effected by the massive power failure on November 9, it is worth noting that most of the men responsible for the fish and the general operation of pumps and tanks came in to check the situation. All of the staff were either present at the Aquarium or checked in by telephone.

Additional parking facilities for 160 cars were made available during the summer in the newly-acquired property on West 8th Street. The well-constructed concrete buildings on the property, once used as locker rooms for bathers, were cleaned out and made into much needed storage facilities, workshops and headquarters for our maintainers and laborers.

Dr. Nigrelli was appointed to the Panel on Biological Oceanography of the President's Science Advisory Committee. This panel was charged with making recommendations for an intensive and accel-

erated national research program in this expanding field.

Dr. Ray was appointed a member of the National Academy of Sciences and the National Research Council's Committee on Polar Research.

The Aquarium assisted in setting up a fish exhibit at the Manhattan Savings Bank during September. Director Emeritus Coates and Aquarium Superintendent Olsen were most active in organizing the exhibit, which proved very popular and attracted an appreciable number of inquiries for membership in the Zoological Society.

## AQUARIUM OPERATIONS

CARLETON RAY, Curator

JOSEPH R. GERACI, Associate Curator

AAGE OLSEN, Superintendent

GUIDO CHIBAS, Associate Superintendent

JEWELL BUNGAY, Business Manager

Two gray seals were born in mid-January, the third set to be born in the Aquarium from parents raised from pups.

Another milestone in the history of the Aquarium was reached with the acquisition and successful transportation of two Weddell and two Crabeater Seals from the Antarctic. Insofar as it is known, the Crabeaters are the first of their kind to be exhibited in North America. These animals were acquired through the courtesy of the United States Antarctic Research Program of the National Science Foundation and were brought in by Mr. Montreuil on a 90-hour flight from McMurdo Sound, Antarctica.

Other donations included three California Sea Lions, which are now in the *Rocky Shores* exhibit of Seal Island together with two young specimens that came to us in a most unusual way. The larger of the two, "Happy," was stranded and in ill-health when we went to pick her up off a barge at Staten Island in mid-July. "Clarence," the second of the stranded pair, was sighted on a private pier in Mott Creek at Cedarhurst, Long Island. It, too, arrived in a rather sad and helpless condition, suffering from apparent exhaustion. Both responded to a rigorous schedule of nursing and medication. The cap-

ture of both "Happy" and "Clarence" was attended by much publicity in the press, radio and television.

Our pair of Beluga Whales adapted quickly to the rebuilt and redecorated Oceanic Tank, and remain in excellent health. An attempt to introduce two female Belugas to the exhibit was unsuccessful. The females obtained in May from Ile aux Coudres, P. Q. Canada, died a month after capture due to a heavy infestation of lung worms.

A sub-adult male porpoise acquired from the Bay of Fundy was hand-fed for three months and showed some promise of continued good health.

#### PENGUINS

Our collection of penguins increased to 13 as a result of several donations by the advertising agency, McCann-Erickson. Three penguins in the colony were lost, one due to respiratory infection and two from acts of vandalism.

## ATTENDANCE AND FACILITIES

Monthly attendance at the Aquarium for 1965 was as follows:

January 7,768	_	July51,520
February19,823		August
March 19,278		September25,817
April		October18,190
May35,719		November16,874
June		December12,085
•	77.1 1 000 071	

Total: 332,871

The attendance figure is up from 296,678 in 1964. The Aquarium continues to be a popular visiting place for school children and other organized groups. During the year we were visited by approximately 57,500 children. All facilities showed a gain in profit over 1964.

The new parking lot on West 8th Street took the added load created by the loss of a large part of our main lot blocked off by construction of the Osborn Laboratories.

The parking lot realized a gross income of \$56,202, with a profit of \$47,461.

Souvenir gross sales for the year were \$33,315.22. The profit was \$12,462.58.

The operation of the restaurant produced a profit of \$10,637.

#### **PUBLICATIONS**

#### Dr. Nigrelli

Studies on Virus Diseases of Fishes. Spontaneous and Experimentally Induced Cellular Hypertrophy (Lymphocystis Disease) in Fishes of the New York

Aquarium, with a Report of New Cases and an Annotated Bibliography (1874-1965). Zoologica, 50 (2): 83-96. With G. D. Ruggieri.

Studies on Virus Diseases of Fishes. Epizootiology of Epithelial Tumors in the Skin of Flatfishes of the Pacific Coast, with Special Reference to the Sand Sole (*Psettichthys melanosticus*) from Northern Hecate Strait, British Columbia, Canada. *Zoologica*, 50 (3): 115-122. With K. S. Ketchen & G. D. Ruggieri.

#### Dr. Baslow

Synthesis and Degradation of Brain N-acetylhistidine in vitro. American Zoologist, 5 (2): 230.

The Effect of Thermal Acclimation on N-acetyl-L-histidine concentration in the Brain of the Killifish, Fundulus heteroclitus. American Zoologist, 5 (2): 238.

Neurosine, its Identification with N-acetyl-L-histidine and distribution in aquatic vertebrates. Zoologica, 50 (1): 63-66.

Paper Chromatography of Extracts of Species of Phytamastigophorea. American Zoologist, 5 (4): 735. With K. Gold.

## Dr. Stempien

Further Observations on the Caribbean Sponge, Cryptotethya crypta. Nature, 207: 217. With R. F. Nigrelli & G. Pulitzer.

## Dr. Geraci

Blood chemistry of the Bottlenose Dolphin, Tursiops truncatus. The American Journal of Physiology, 209 (1): 169-172. With William Medway.

## Dr. Ruggieri

The Effect of Metrazol on Developing Fish Embryos. American Zoologist, 5 (4): 733. With M. H. Baslow & R. F. Nigrelli.

Chromatographic Patterns of UV Fluorescent Substances from Extracts of Fish Embryos. American Zoologist, 5 (4): 740. With M. H. Baslow & R. F. Nigrelli.

## Dr. Kallman

Functional capacity of ectopic pituitary transplants in the teleost *Poecilia formosa*, with a comparative discussion on the transplanted pituitary. *Philosophical Transactions of the Royal Society of London*, 249: 69-99. With J. N. Ball, Madeleine Olivereau & Anna M. Slicher.

Genetics and Geography of sex determination in the poeciliid fish, Xiphophorus maculatus. Zoologica, 50: 151-190.

Cytophotometric evidence for tripoidy in hybrids of the gynogenetic fish, *Poecilia formosa. J. Exp. Zool.*, 160: 155-170. With Ellen M. Rasch, R. M. Darnell & P. Abramoff.

Sex determination in the teleost Xiphophorus milleri. American Zoologist, 5: 246-247.

Sex determination in the teleost Xiphophorus maculatus. Genetics, 52: 450-451.

Cytophotometric evidence for triploidy in exceptional offspring of the gynogenetic fish *Poecilia formosa. J. Cell. Biol.* 27: 80-81A. With Ellen M. Rasch, R. M. Darnell & P. Abramoff.

#### Dr. Schreibman

The effect of hypophysectomy on freshwater survival and scale mucous cells in two species of freshwater fishes. *American Zoologist* 5: 728. With K. D. Kallman.

#### DR. RAY

Three whales that flew. Ameryka, Nr. 73, Cena 102L: 12-13.

23 meter im Taucheranzug unter dem Polareis.  $Das\ Tier$ , Februar, Nr. 2: 4-10.

The noisy underwater world of the Weddell Seal (Part 1). Animal Kingdom, 68 (2): 34-39. With William E. Schevill.

La creation des parcs marins, une necessité. Actualites marines, 9 (1): 19-24. The Weddell Seal at home (Part 2). Animal Kingdom, 68 (5): 151-154.

With William E. Schevill.

Physiological ecology of marine mammals. *BioScience*, 15 (4): 274-277.

Shunt mechanism enzymes in the tissues of the Weddell Seal. Abstract. *American Zoologist*, 5 (4): 669-670. With George H. Fried, J. Hiller, J. Rabinow & William Antopol.

## Dr. Goreau

On the Predacean of Corals by the Spiny Starfish Acanthaster planci from the South Red Sea. Report, Israel SO. Red Sea Expedition.

Evidence for Soluble Algal Factor Produced by Zooxanthellae of *Tridacna elongata*. Abstract. International Conference of Tropical Geography. With Nora I. Goreau & C. M. Yonge.

## PERSONNEL

Mr. Montreuil visited Bermuda in July, where, with the help of Trustee Frick, he made photographs of a wide variety of the fish species included in our collection. These photographs will eventually be used for our new fish identification labels.

Dr. Ray spent one week in the Canadian Arctic with Dr. Arthur Mansfield of the Arctic Unit of the Fisheries Research Board of Canada. Dr. Mansfield has been conducting biological and ecological studies on the Narwhal during the past several years. The purpose of Dr. Ray's trip was to determine the feasibility of capturing live Narwhals. It seems that the potential cost of a collecting expedition may not be as high as orginally expected. The Narwhal has never been exhibited and would make a striking addition to our collection.

During the year, Dr. Ray attended meetings of the Society of Mammalogists in Winnipeg and the National Research Council's Panel on Polar Research in Washington, D.C. He lectured on the Antarctic to Kane Lodge of the Masons, the Scarsdale Women's Club, the Riverdale-on-Hudson Garden Club, Medical Strollers at the Union Club, Deerfield Academy and to biology students at C.W. Post College.

Toward the year's end, Dr. Ray left for the Antarctic to undertake part of the New York Zoological Society's research project on Antarctic seals, which is supported by a grant from the National Science Foundation.

Dr. Geraci attended a post-graduate course on "Methods in Research" given by the Armed Forces Institute of Pathology, Washington, D.C., and the First Symposium on "Diseases of Captive Cetacea," held in Kissimmee, Florida. He presented a paper at the latter entitled "The Pathology of Gastric Ulcers in Bottle-nosed Dolphins; the Possible Role of Dietary Histamine in Ulcerogenesis."

# Collaborators and the Nature of Their Collaborations with the New York Aquarium

Dr. Peter Abramoff, Marquette University, Milwaukee, Wisconsin. Gynogenesis in *Poecilia formosa*.

Dr. Eugene Agalides, General Dynamics/Electronics, Rochester, N.Y. Effects of drugs on electric fishes with relation to temperature adaptation.

DR. WILLIAM ANTOPOL, Director, Pathology Department, Beth Israel Hospital, New York. Diseases and pathology of cetaceans and other marine mammals.

Dr. James W. Atz, American Museum of Natural History, New York. Genetics of Xiphophorus.

Dr. John N. Ball, University of Liverpool, England. Pituitary of poeciliids.

DR. ION O. COCIOBA, Beth Israel Hospital, Microbiology of pinnipeds.

DR. HARRY CHARIPPER, Department of Biology, New York University. Comparative Histology of Fishes.

Dr. Rezneat Darnell, Marquette University, Milwaukee, Wisconsin. Gynogenesis in *Poecilia formosa*.

Dr. R. Endean, Department of Zoology, University of Queensland. Studies on toxic Australian starfishes.

ERWIN ERNST, M. S., Chairman, Department of Biology, Setauket High School, Long Island. Sub-aqua expert. Starfish distribution and ecology.

Dr. Francis H. Fay, Arctic Health Research Center, Anchorage, Alaska. Temperature regulation, nutrition and growth of walruses.

ELMER T. FELTZ, Arctic Health Research Center. Microbiology and virology of pinnipeds.

Dr. Harold Fink, Director of Laboratories, Coney Island Hospital. Pathology of Marine animals.

Dr. George H. Fried, Beth Israel Hospital. Enzymology of pinnipeds.

Dr. Kurt Gerstmann, Staff Pathologist, Coney Island Hospital. Pathology of marine mammals.

PETER R. GIMBEL, New York, N.Y. Diving-photography in Antarctica.

Dr. Kenneth Gold, Laboratory of Marine Biology, Lamont Geological Laboratory, Columbia University, Palisades, New York. Imidazole compounds in fish brains and in phytoflagellates.

Dr. Eli Goldsmith, New York University Dental College. Effects of holothurin on various biological systems,

DR. Albert S. Gordon, Department of Biology, New York University Graduate School of Arts and Science. Comparative hematology.

Dr. Robert W. Harrington, Jr., Entomological Research Center, Vero Beach, Florida. Hermaphroditic Rivulus.

DR. MILAN J. KOPAC, Department of Biology, New York University Graduate School of Arts and Science. Cyto-and-histochemistry of melanomas in platy-fishes.

Dr. William J. Kuhns, Department of Pathology, New York University School of Medicine. Comparative Serology of fishes.

 $\ensuremath{\mathsf{Lt}}.$  David O. Lavallee, USN. Underwater technology and sound production of pinnipeds.

Dr. L. Edgar Lee, Department of Pathology, Yale University. Diseases of fishes, generally; electron-micrographic studies of trout liver tumors and papillomas in the Bahamian slippery dick.

Dr. John J. A. McLaughlin, Haskins Laboratories, New York. Pharmacological studies on dinoflagellate toxins.

Dr. William Medway, Department of Clinical Pathology, University of Pennsylvania, School of Veterinary Medicine. Blood Studies in Cetacea.

Dr. Robert R. Miller, Museum of Zoology, University of Michigan. Gynogenesis in fishes.

Dr. Gustavo Pulitzer, Portofino, Italy. Collection and identification of sponges.

 $\ensuremath{\mathsf{DR}}.$  Ellen M. Rasch, Marquette University, Milwaukee, Wisconsin. Gynogenesis in  $Poecilia\ formosa.$ 

Dr. Donn E. Rosen, American Museum of Natural History, New York. Genetics and evolution of Xiphophorus.

Professor Michele Sara, Director of the Institute of Comparative Zoology, University of Bari, Italy. Collection, identification and biochemistry of sponges.

William E. Schevill, Woods Hole Oceanographic Institution. Bioacoustics of marine mammals.

DR. R. JACK SCHULTZ, Department of Zoology, University of Connecticut. Gynogenesis in fishes.

 ${\tt Miss}$  Edna Stein, Senior Bacteriologist, Coney Island Hospital. Microbiology of marine animals.

Dr. Horace Stunkard, American Museum of Natural History. Protozoan and helminthic parasites of fishes and marine mammals.

Dr. Henry Vogel, Bureau of Laboratories, Department of Health, New York. Salmonella and other terrigenic disease-producing bacteria in fishes and in marine mammals.

 $\label{eq:William A. Watkins, Woods Hole Oceanographic Institution. Bioacoustics of marine mammals.$ 

# RESEARCH AND REPORT OF THE LABORATORIES

Aquarium Laboratory and Staff Research. Paul L. Montreuil, Director of the Aquarium; Ross F. Nigrelli, Pathologist and Director of Research; Carleton Ray, Curator; Joseph R. Geraci, Associate Curator and Veterinarian; Dr. William Antopol, Beth Israel Hospital, Fellow and Research Collaborator; Johanna van de Kerkoff, Technician.

Drs. Nigrelli and Ruggieri completed two extensive studies on virus diseases of fishes, one causing cellular hypertrophy in fishes generally and the other inducing tumors (Papillomas) in several species of soles along the Pacific Coast.

We were fortunate in having controlled the fish parasite *Crytokaryon irritans*, which plagued most of our exhibit specimens last year. Losses due to this and other parasites to which marine fishes are susceptible were minimal during 1965. Drs. Nigrelli and Ruggieri were successful in elucidating the life cycle of *Crytokaryon*, a knowledge of which was needed in order to treat this condition with a more scientifically accurate approach than was formerly possible.

Several new research programs are under way which may be fruitful in terms of better maintenance of our collections. One such program involves hematology and blood chemistry studies of Beluga whales. Dr. Geraci obtained blood samples from six newly-captured Beluga whales at the site of capture in Ile aux Coudres, P. Q. Canada. The results of these studies, combined with the results of tests on blood samples obtained from Alex and Blanchon of our collection, show promise of being a valuable tool in determining the state of health of Beluga whales prior to transporting them to the Aquarium. This work will soon be published in collaboration with Dr. William Medway, Associate Professor of Clinical Pathology, University of Pennsylvania, School of Veterinary Medicine, and Dr. Harold Fink, Director of Laboratories, Coney Island Hospital, Brooklyn, N.Y.

Necropsy examination of a Hooded Seal revealed a new disease entity in marine mammals. In collaboration with the Department of Laboratories, Coney Island Hospital, and the New York City Department of Health, a definite diagnosis of Salmonella typhi-murium infection was established. The public health aspects of this disease became readily apparent and the pool mates of this seal were immedi-

ately isolated. A thorough examination, including bacteriological studies of all animals that had been associated with the Hooded Seal, indicated that there was no similar infection present. Human contact and bird droppings are suspected as possible origins of this condition.

One of the four Harbor Porpoises which were acquired in September succumbed to a lung infection from which *Nocardia asteroides* was isolated. This micro-organism is known to be pathogenic for cattle, dogs, cats, marsupials and man, causing a tuberculosis-like disease. This has never been reported in marine mammals, and its occurrence has aroused considerable interest and deep concern regarding the source of infection.

A Bottle-nosed Dolphin, which was sent to us for necropsy from a private aquarium, was shown to have gastric ulcers. In a consideration of the possible causes of stomach ulcers in mammals, Dr. Geraci theorized that products of decomposition of fish, namely, histamine, could contribute to the formation of these lesions. There is a great deal of evidence in support of this theory, and this reaffirms the emphasis which we have placed on feeding only the highest quality food-fish. Dr. Kurt Gerstmann, Staff Pathologist, Coney Island Hospital, is collaborating with Dr. Geraci in an investigation of this problem.

A summer research problem by Dr. Geraci for studies on pathology of the liver in fishes revealed some interesting findings. An investigation was made to establish abnormal changes in the liver as a result of lowered oxygen tension and pollution. An enzyme, which varies in concentration depending upon the state of health of the fish, was shown to be present in the liver. Unlike the activity of similar enzymes in mammals, there was no change in the concentration due to anoxia, but there were significant changes in fishes which had been in contact with pollutants. This research was supported by Society funds.

Laboratory of Marine Biochemistry and Ecology. Ross F. Nigrelli, Director of Research; Martin F. Stempien, Jr., Senior Investigator and Research Associate; Morris H. Baslow, Research Associate; George D. Ruggieri, Research Associate; Vincent Ligouri, Research Assistant; Guido J. Rio, Research Assistant; Wells P. Owen, Technical Assistant; E. L. Bohm, Special Research Assistant; Paul Chapman, Research Assistant and Sub-Aqua Expert.

The John A. Hartford Foundation, Inc., renewed its grant to the Society for an additional two years in the amount of \$215,000 for continued studies on biologically-active substances extracted from marine organisms.

Early in 1965, Dr. Nigrelli and Dr. Stempien spent 10 days in Jamaica making a collection of sponges, crinoids and sea stars. In addition, arrangements were made with Mr. Paul Chapman, our Sub-Aqua expert, to expand this collection of material with specimens from deeper waters. To date, his deepest specimen has come from a depth of 300 feet. Some 100 species of sponges, 10 species of sea urchins and three species of crinoids, in addition to smaller numbers of other marine invertebrates, have been shipped to our laboratory for routine biological testing. A number of sponges showed considerable antibiotic or toxic activity, and work is progressing on the isolation and characterization of the substances responsible.

During the testing of these animals, Dr. Stempien found that extracts of four of five species of sponge of the genus Agelas showed considerable antibiotic activity but were non-toxic to fish. Partial purification of the extracts of one of these has yielded a fraction on which some chemical testing could be done. The data obtained led us to propose the structure of a dihydroxy-indole for the active substance. This material, therefore, is closely related to a number of physiologically-active compounds, among which are reserpine, a potent tranquilizer, and mescalin, a halucinogenic. It should prove a very interesting compound when its complete structure is known.

Our studies on the saponin-like compounds isolated from the Echinodermata have been extended to a number of sea urchins. These include the species Clypeaster rosaseous and Lytechinus variegatus from Jamaica and Strongylocentrotus purpuratus from the Pacific Coast. Substances were isolated from these animals which were very similar to the saponins isolated from the sea stars and sea cucumbers, with the exception that they were virtually non-toxic to fish. Further biological testing of these materials is, at present, underway.

The effect of the various marine toxins isolated in this laboratory on embryogenesis has always been an important part of our work, as this effect is usually an expression of the mode of action of the toxin. Dr. Ruggieri's studies with developing sea urchin eggs have shown that the echinoderm toxins interfere with the normal expression of protein metabolism in the developing larva and lead to a number of tertalogical effects. These studies have now been extended to developing fish embryos. It has been found that the appearance of various substances is characteristic of both stages of development and the Order and Family of the experimental animal. With this information, the effects can be studied in order to increase our knowledge of their physiological action.

Laboratory of Fish Genetics. Klaus D. Kallman, Principal Investigator; Judith Fromowitz Kallman, Laboratory Manager; Martin P. Schreibman, Visiting Research Associate; Harold Wurf, Technician.

Although tissue transplantation is usually considered a medical problem, the transplantation of fins (skins) has been used by us for many years to study genetic variability of large and small populations of fish. Previously, we had established that tissue specificity in fish is as highly developed as in mammals, including man. The chances that two fish born to the same parents possess a genotype sufficiently similar to accept permanent tissue grafts from each other is probably less than one in 100,000. But in small populations a considerable amount of inbreeding has to take place, and this will result in a gradual decrease of the genetic variability and lead to partial homozygosity. It is commonly held that inbreeding is undesirable and deleterious in animals. During the 1965 expedition to northeastern Mexico, we discovered in a small spring an isolated population of X. variatus xiphidium. This population is separated from the nearest permanent stream inhabitated by xiphidium by more than 30 miles of dry stream bed. Transplants of fins between sibs of two matings derived from this population were successful in 50 to 75% of all cases and grafts among the offspring of a third mating were accepted by more than 90% of the hosts. Fin grafts exchanged between the offspring of different matings survived in 40 to 50% of all hosts. Controls involving X. v. xiphidium of a large population were negative. The high percentage of takes indicates that fish of the small population have become homozygous for most genes. This species can apparently survive both under outbreeding and inbreeding conditions. The problem of homozygosity of small populations has an important bearing on the survival of many endangered species which, because of encroaching civilization, become restricted in limited numbers to refuges or zoos. Many of these species will have to adjust themselves to a rapidly decreasing gene pool.

Until last year the Genetics Laboratory possessed the only species of rigidly inbred fish, X. maculatus. We can now announce that two more homozygous strains are available. X. c. couchianus, strain Xc-G and Xc-I A, are sufficiently inbred to give 100% graft survival.

The unusual teleost *Poecilia formosa* (the Amazon Molly) is an all-female species that reproduces in nature and in the laboratory by gynogenesis. The females "borrow" the sperm of males of other related species, but the sperm merely activates the eggs without contributing any genetic material. Several stocks of *P. formosa* are main-

tained. Among several thousands of fish bred in the laboratory there were 14 that exhibited traits of the paternal species. When tissue grafts were made from the *formosa* clone to which the female parent belonged into the hybrid it was found that these grafts survived indefinitely. Reciprocal grafts, however, were unsuccessful. At one time these experiments were interpreted as showing that *P. formosa* is homozygous and that the hybrids shared one identical set of chromosomes and genes with the maternal *formosa* clone. However, in collaboration with Dr. Rasch of Marquette University, it was established that the rare hybrids were actually triploid, possessing two sets of *formosa* chromosomes and one set of *sphenops*, which served as the male parent.

Dr. Schreibman continued his investigations on the effects of hypophysectomy on freshwater survival. It seems now that all cyprinodont fishes that normally live in fresh water need a pituitary hormone to survive in fresh water. When the hormone is removed by hypophysectomy the fish have to be maintained in dilute sea water. Experiments with *Betta splendens* showed that the need for this "pituitary fresh water factor" is not restricted to cyprinodont fishes. Hypophysectomized *Betta* also have to be maintained in dilute sea water. Following pituitary removal there is a drastic reduction in the number of mucous cells per scale. A possible relationship between mucous production and fresh water survival is being investigated.

Dr. Schreibman discovered in one of our stocks of platyfish, *Gp*, maintained by brother-to-sister matings for many generations, a high incidence of abnormal nituitary glands.

incidence of abnormal pituitary glands.

Physiology and Ecology of Coral Reefs. Thomas Goreau, University of the West Indies, Jamaica, and John W. Wells, Cornell University, Principal Investigators; Nora I. Goreau, Research Associate; Dr. Rosemary Chapman and Miss Eileen Graham, Research Field Assistants; Ross F. Nigrelli, Consultant.

A grant of \$54,000 was awarded to the New York Zoological Society in 1965 by the National Science Foundation for the continued support of studies dealing with the physiology and ecology of coral reefs off the north coast of Jamaica. The grant was made for two years specifically for the study of the vertical distribution range of tropical, shallow water, hermatypic corals and to gain a better ecological understanding of this little known reef zone. To date 59 species of shallow water corals, including 46 hermatypic and 13 ahermatypic forms, were identified; 14 of these were new records for Jamaica. Among them were several known previously only from single finds and, therefore, believed to be extremely rare. Five new species were found,

all of them abundant. In addition, there were a large number of ecovariants of known species. Four corals previously regarded as distinct species were found to be growth forms of others, necessitating the invalidation of their former names.

Marine Fouling Laboratory, U. S. Naval Applied Science Laboratory.
ARNOLD FRIEBERGER, USASL Materials Engineer, Material Sciences Division; Christopher Cologer, USASL Materials Engineer; Brenda Jonas and George Seifert, New York Aquarium, Technical Assistants; Ross F. Nigrelli, Consultant.

The development of techniques for the maintenance of large numbers of barnacles of several species in various stages of development has made it possible to study various factors that may be critical for the fouling phenomenon. A knowledge of these factors formed the basis for the experimental evaluation of several new anti-fouling coatings developed by the Navy.

#### PERSONNEL

Mr. Lothar Bohm and Mr. Paul Chapman were added to the staff of the Osborn Laboratories of Marine Sciences as Research Assistants in Biochemistry and as Collector, respectively. Both persons are stationed in Jamaica, West Indies, working under the close supervision of Dr. Thomas Goreau, Principal Investigator of our program on Coral Reef Ecology. Paul Chapman, a certified sub-aqua expert, together with Dr. Goreau's team of divers, made extensive collections of sponges and deep sea echinoderms for our studies on biologically-active compounds from marine organisms. Both he and Mr. Bohm obtained, processed and shipped to the Aquarium many species and large quantities of these marine animals.

Dr. Morris Baslow left in August to join the staff of the Pacific Biomedical Center, University of Hawaii, Honolulu, and Guido Rio and Vincent Ligouri were appointed to the teaching staff as Assistant Professors in the Department of Biology of St. John's and Long Island (C. W. Post College) Universities, respectively. In addition, Dr. George D. Ruggieri, S.J., was assigned by his Provincial to a teaching post at St. Joseph's College, Philadelphia. However, arrangements were made with his superiors to allow him to spend at least four days a month in research in our laboratories during the school term and full time during the summer months.

In July, Dr. Nigrelli attended meetings of the Society of Protozoologists and the 2nd International Conference on Zoology at the Imperial College of Science and Technology in London. Dr. Nigrelli was one of the founders and first president of the Society. From

London, he proceeded to Italy for meetings with Dr. Gustave Pulitzer, Professor Michele Sará and Professor Francesco Chiretti from the University of Bari and with Dr. Peter Dohrn, Director of the Naples Aquarium and the Stazione Zoologica, to discuss the collections of sponges and *Bonellia* from the Ligurian, Adriatic and Mediterranean Seas.

Dr. Nigrelli gave lectures on "Biomedical Aspects of Marine Biology" to the following: Merck Scientific Club, Rahway, New Jersey; Research Society of America (Sigma Xi) of the DuPont Experimental Station, Wilmington, Delaware; American Cyanamid Research Foundation, Princeton, New Jersey, and to the Biology Department of C. W. Post College of Long Island University. He also lectured on "Fish Diseases and Comparative Pathology" to the seminar students in the Biology Department of Fordham University and to the interns at the Animal Medical Center, New York City.

Dr. Nigrelli was appointed a member of the committee of the National Institutes of Health, Biomedical Division, that made a site visit to the Pacific Marine Biomedical Center, University of Hawaii. The purpose of the site visit was to evaluate a research proposal submitted to NIH that was concerned, in part, with the development of marine resources in the Pacific area. While in Hawaii, he visited Sea Life Park, Waikiki Aquarium and the Marine Laboratory of the University on Coconut Island.

A site visit committee from the National Institutes of Health came to the Aquarium to evaluate our facilities in reference to the transfer of Dr. Myron Jacob's NIH grant on "Neuroanatomy of Cetaceans" from the New York Medical College to the Department of Comparative Marine Pathology, Osborn Laboratories of Marine Sciences.

Dr. Schreibman participated in a symposium on "Modern Approaches to the Study of the Adenohypophysis," held in San Francisco, and lectured on "Structural and functional aspects of the pituitary glands in fishes." Dr. Kallman gave a seminar at Brooklyn College on "The Evolution of Sex Determination in Poeciliid Fishes" and gave a talk on "The Genetic Aspects of Tissue Transplantation" to the Biology Club of City College. In May, Dr. Kallman attended the conference "Intersexuality in Fishes" held at the Cape Haze Marine Laboratory, Sarasota, Florida, where he lectured on the "Problems of Genetic Sex Reversals in Poeciliid Fishes."

## CENSUS OF THE AQUARIUM, December 31, 1965

P	HYLUM CHORDATA			
	CLASS CHONDRICHTHYES	s-Sharks, Rays & Chimeras	Species &	Specimens
	Orders		Subspecies	
	SQUALIFORMES	Sharks	2	2
	Rajiformes	Rays	2	2
	CLASS OSTEICHTHYES-BO	DNY FISHES		
	Acipenseriformes	Sturgeon	1	3
	Clupeiformes	Tarpon, Herrings, bonefish		29
	Cypriniformes	Catfishes, minnows	. 4	9
	Anguilliformes	True eels	2	3
	Cyprinodontiformes	Killifishes		175
	GADIFORMES	Codfishes, etc.	. 1	1
	Gasterosteiformes	Sticklebacks, pipefishes		
		seahorses, etc.		12
	BERYCIFORMES	Squirrelfishes, etc		12
	Perciformes	Perch-like fishes		252
	PLEURONECTIFORMES	Flatfishes	3	8
	Tetraodontiformes	Trunkfishes, Trigger		
	_	fishes, puffers, etc.	5	8
	BATRACHODIFORMES	Toadfishes		12
	DIPNOI	Lungfishes		1
	OSTARIOPHYSI	Piranha	2	4
	CLASS REPTILIA—REPTIL			_
	TESTUDINES	Turtles	3	5
	CLASS AVES—BIRDS	. ·		=
	SPHENISCIFORMES	Penguins	1	7
	CLASS MAMMALIA-MAN		Ħ	15
	PINNIPEDIA	Seals, Sea lions & Walruses	7	17
	Сетасеа	Whales		2
		ES	2	50
P	HYLUM COELENTERATA		_	400
	CLASS ANTHOZOA—CORA	ls and Anemones	. 7	490
P	HYLUM ANNELIDA			
T		RINE WORMS	. 1	25
P	HYLUM ARTHROPODA	C	_	011
		TERS, SHRIMPS, CRABS, ETC	_	$\frac{211}{2}$
_			. 1	2
P	HYLUM MOLLUSCA		0	0
		NAILS		3
		TERS, CLAMS, ETC		25
_		CTOPUS, SQUIDS	. 1	1
P	HYLUM ECHINODERMATA		_	40
		RFISHES		40
		-SEA CUCUMBERS		3
	CLASS ECHINOIDEA—SEA	Urchins		25
		Totals	. 133	1439
S	ummary: Species & Subsp	ecies, 133; Specimens, 1439.		

## GENERAL ACTIVITIES

# INSTITUTE FOR RESEARCH IN ANIMAL BEHAVIOR

## including the

## Department of Tropical Research

Donald R. Griffin, Director

JOCELYN CRANE, Director, Department of Tropical Research

MICHAEL G. EMSLEY, Assistant Director, William Beebe

Tropical Research Station

Associates, Department of Tropical Research:

JANE V. Z. BROWER; L. P. BROWER; WILLIAM G. CONWAY;

JULIE C. EMSLEY; WILLIAM K. GREGORY;

DAVID W. SNOW; JOHN TEE-VAN

THE YEAR 1965 HAS BEEN FULL and active for the Department of 1 Tropical Research. More visiting scientists have worked at the William Beebe Tropical Research Station than ever before. Furthermore the basic research program of the Society has been substantially augmented by the establishment in December of the Institute for Research in Animal Behavior in cooperation with The Rockefeller University (formerly Rockefeller Institute). The stated purpose of the new enterprise is "to combine the relevant resources of both institutions for the investigation of the behavior of living organisms, the influence of environment on behavior and the relevance of animal to human behavior." The bulk of this report will be comparable to those submitted in previous years by the Department of Tropical Research, because during 1965 the additional activities of the Institute for Research in Animal Behavior were necessarily limited to planning and preparation of new facilities, as described in the final section of this report.

THE WILLIAM BEEBE TROPICAL RESEARCH STATION

The physical plant of the Beebe Station in Trinidad was substantially increased during the year by the construction of a new house

on the Verdant Vale tract of land purchased in 1964. The building will provide a residence for the Assistant Director and his family, together with badly needed new housing for visiting scientists.

With the aid of the grant from the National Science Foundation in support of Miss Crane's research on the communication and social behavior of Arthropods, a unique new acoustical laboratory was largely constructed in September with the advice and supervision of Michael Flinn from the Acoustics Research Laboratory, Harvard University. Adequate recording and experimental analysis of the role of insect songs in social behavior require conditions of isolation from other sounds, just as studies of vision require a darkroom.

Other buildings, roadways and grounds have been maintained and improved in minor ways through dull, time-consuming work by the local staff at all seasons. This ranges from painting, through antitermite measures, to rolling "oil sand" from the Pitch Lake formation of Trinidad into holes eroded in the driveway by traffic and torrential rains. Our other major improvement in physical plant has been a greatly enlarged electrical supply to the main laboratory complex at Simla to care for the greatly increased electrical load now thrown on our lines by air conditioners, dehumidifiers, electronic apparatus, insect attracting lights and many other devices employed by ingenious scientists in their studies of tropical animals.

The scientific utilization of the Beebe Station reached an all time high, and the Station was active continuously throughout the year. Visiting investigators worked for a total of approximately 1,350 "scientist days" at the Station. When staff scientists are included the total becomes equivalent to six full-time research workers every day for the entire year. This is approximately 40% of a theoretical maximum possible utilization (15 staff and visiting scientists continuously throughout the year) and is distinctly above comparable figures for other distinguished research stations. But this theoretical maximum is a purely academic figment of the statistician's imagination, since it would require a much larger permanent staff to maintain the Station continuously at the activity level represented by 15 scientists working at the same time. Only by postponing maintenance work, the accumulation of living animals for future research and other necessary chores to times when visiting scientists are fewer in numbers has it been possible to maintain the high standards and efficient operation we have come to expect from the Beebe Station. The availability of the Station throughout the year has greatly facilitated important research work at all seasons, but the principal influx of visiting scientists continues to occur during the customary summer recess

of colleges and universities. Although this is the rainy season in Trinidad, highly technical work is nevertheless feasible, thanks to such modern improvements as dehumidifiers and transistorized electronic instruments that are less vulnerable to the tropical humidity than their counterparts in previous years.

#### PERSONNEL AND RESEARCH

On January 1, 1965, Dr. Michael G. Emsley became Assistant Director of the William Beebe Tropical Research Station. Mrs. Emsley provided substantial assistance preparing drawings for scientific papers and by carrying out much of the tedious work required in rearing insects for experimental work and genetical studies. The Emsleys worked with Miss Crane on the preliminary phases of the new program of research on the communication and social behavior of the Tettigonioidea.

Professor Lincoln P. Brower of Amherst College has continued his investigations of mimicry in Trinidad insects, with the collaboration of Dr. L. M. Cook of Manchester University, England. They were assisted by John Alcock, Kenneth Frank and J. Meyers of Amherst College and the Graduate School of Arts and Sciences, Harvard University, as well as by J. Brower and M. Cook. The principal experiments were a continuation of previous measurements of the advantage of an artificial mimic in a natural neotropical environment.

A third major research effort during 1965 has been the analysis by Dr. Stewart Swihart and John Baust from the State University College, Fredonia, New York, of the neurophysiological basis of color preferences in butterflies of the genus *Heliconius*, which have been so extensively studied by Miss Crane over several previous years. They find selective responses to color in the brains of butterflies, and these differ between closely related species which react to specific colors in their courtship behavior.

In addition to these continuing studies of color vision, Dr. Swihart has opened up a new line of physiological research on butterflies by demonstrating experimentally that they have auditory sense organs which respond to sounds of about 600 to 3000 cycles per second. While naturalists reported many years ago that butterflies respond to sound, Dr. Swihart has identified the sense organs responsible and studied them by recording electrical potentials from the receptor cells or sensory nerves.

Dr. Donald R. Griffin, Timothy Williams, a graduate student at Harvard and The Rockefeller University, and Mrs. Janet Williams have continued and intensified their studies of the long-range navigation of bats in Trinidad. They have selected a large and abundant

species, the Spear-nosed Bat (*Phyllostomus hastatus*) which are so attached to their favorite caves that they return more rapidly and in larger proportion than other bats previously studied in temperate latitudes. At the very end of 1965, the Williams and Peter Hartline, a graduate student from Harvard University, began a new phase of research on bat homing by successfully attaching miniature radio transmitters to a few spear-nosed bats and following them for a mile or more during their homing flights. Dr. Griffin was recipient of the 1965 Phi Beta Kappa Award in Science for his book. *Bird Migration*.

Two visiting scientists associated with Dr. Griffin worked at the Beebe Station on aspects of the sensory physiology of insects directly related to communication and social behavior. Dr. and Mrs. Nobuo Suga from Harvard University and the University of California, Los Angeles, finally captured the mysterious "Snarley Buzz" which we had been hearing at Simla for several years with our "bat detectors" or portable apparatus for translating ultrasonic sounds into the range of human hearing. The real sources proved to be small, protectively-colored members of the same family Tettigonioidea that Miss Crane and the Emsleys have already begun to investigate (genera *Phlugis* and *Conocephalus*). Not only did Dr. Suga induce the same ultrasonic songs in captivity, but he discovered how they are produced by rubbing together specialized file-like structures on the insect's body.

Dr. and Mrs. Hubert Markl from the University of Frankfurt, Germany, Harvard and The Rockefeller University, spent several weeks at Simla studying the "sounds" made by certain of the ants, especially the colonial leaf-cutting ants of the genus *Atta*. These ants stridulate when they are buried by small-scale landslides in their burrows and other ants dig them out. These "S-O-S" signals are not sound waves transmitted through the air but vibrations of the earth or other solid material with which the sending and receiving ants are both in contact.

#### TRAVEL

During September, Dr. and Mrs. Emsley conferred in New York, Philadelphia and Colorado with experts on the systematics of the butterfly, katydids and other insects the behavior of which will be studied with the support of the new grant from the National Science Foundation. Miss Crane was a delegate to an international congress on Crustacea at Ernakulam in southern India and to a symposium on ritualization in animals and man organized in London by Sir Julian Huxley. She also presented a Sigma Xi lecture at Smith College and another lecture to the Society of Women Geographers in New York. Dr. Griffin presented a paper in September at the Interna-

tional Ethological Congress in Zurich, Switzerland, and gave the David French Lecture at the Claremont Colleges, Pomona, California, in December.

Establishment of the Institute for Research in Animal Behavior

The Rockefeller University (known until last June as the Rockefeller Institute) is expanding its area of research and graduate education to include the behavioral sciences, and as part of this expansion Dr. Griffin joined its faculty July 1, 1965, and became director of the Institute for Research in Animal Behavior. During the year this cooperative research program consisted of the Society's Department of Tropical Research together with investigations of the orientation of bats and other animals which are currently being carried out in newly remodelled laboratories in Theobald Smith Hall of The Rockefeller University on York Avenue at 66th Street.

During the fall remodelling work was begun to convert one of the former Farm-in-the-Zoo buildings east of the Bronx River into versatile laboratories, workshops and small offices. When completed in 1966 this new facility will be uniquely suited for research in animal behavior.

## Contributions, 1965

- 1068. Courtship Behavior of the Queen Butterfly, Danaus gilippus berenice (Cramer). Lincoln Pierson Brower, Jane Van Zandt Brower, and Florence Pitkin. Zoologica, 50 (1): 1-39.
- 1069. Evoked Potentials in the Visual Pathway of *Heliconius erato*. (Lepidoptera). S. L Swihart, *Zoologica*, 50 (1): 55-61.
- 1070. Speciation in *Heliconius* (Lep., Nymphalidea): Morphology and Geographic Distribution. Michael G. Emsley. *Zoologica*, 50 (4): 191-254.
- 1071. A Technique for the Recording of Bioelectric Potentials from Free-flying Insects (Lepidoptera: Heliconius erato). S. L Swihart and J. G. Baust. Zoologica, 50 (4): 255-258.
- 1072. Acoustic Orientation by Fish-eating Bats. Roderick A. Suthers. J. Exptl. Zool., 158 (3): 319-348.
- 1073. Stridulation in Leaf-Cutting Ants. Hubert Markl. Science, 149 (No. 3690; Sept. 17): 1392-1393.
- 1074. We all Ritualize Our Behavior Sometimes. Jocelyn Crane. Animal Kingdom, October, 1965: 155-156.
- 1075. The Bird—Its Form and Function. C. William Beebe, with a new introduction by Dean Amadon. Republished by Dover Publications. xi + 496 pp.
- 1076. Annual Report of the Department of Tropical Research for 1964.

## PUBLICATION AND PHOTOGRAPHY

William Bridges, Curator

JOHN L. MILLER, Associate Curator

DOROTHY REVILLE, Editorial Assistant

Sam Dunton, Photographer

HENRY M. LESTER, Photographic Consultant

This was a year of transition, one which marked the approaching retirement of William Bridges and the hiring of John L. Miller as his eventual successor. (Mr. Bridges retired and was succeeded by Mr. Miller on January 31, 1966.)

From the opening of the Zoological Park in 1899 through 1965—a period of 66 years—the Society has had just two men heading this department. The first was Elwin R. Sanborn, who retired at the end of 1934, followed by Mr. Bridges. Few men in the Park's history have left their mark as have these men. The "Bridges Era" was, first of all, an extremely productive period. It was a period in which the old "Bulletin" was restyled and renamed Animal Kingdom. Zoologica, the Society's scientific journal, was put on a quarterly publication schedule. It was also a period which saw regular radio and television programs at the Zoo and the publication of many books and pamphlets, either written or edited by Mr. Bridges.

Mr. Miller came to the Society directly from the news division of the National Broadcasting Company, where he had worked as a television news writer. Previously, he had worked as a staff writer for the Miami (Florida) Herald, the Associated Press (in New York) and the New York World-Telegram & Sun. He had visited the Zoo frequently over a two-year period as a feature writer for the World-Telegram.

Mr. Dunton produced two color motion pictures: a 15-minute feature on the Zoo entitled "Zoo Short Stories" and an 11-minute film about activities at the Aquarium called "The Sea on Show." Mr. Miller produced an eight-minute feature on the collecting of Tufted Puffins for the Zoo from footage shot by David and Lyn Hancock. Mr. Bridges also completed a 60,000-word popular version of Lee S. Crandall's "The Management of Wild Animals in Captivity," to be published in 1966 by the University of Chicago Press under the title "A Zoo Man's Notebook."

#### MEMBERSHIP

## GORDON CUYLER, Membership Chairman

BY YEAR'S END, membership in the Zoological Society reached an all-time high of 5,742. We gained 1,103 new members in 1965. The increase over 1964 came to 616. Income from membership dues totaled \$106,468, the first time this figure went over \$100,000.

As usual, the Society's special events for members were very popular. The ballroom of the Hilton Hotel barely held the crowd that attended the annual mid-winter meeting. Curator-conducted tours of the Zoo and Aquarium attracted large and enthusiastic groups of members, as did the Spring Garden Party at the Zoo and four special programs for members' children.

There were two Society newsletters sent to members and prospective members during the year. In March, Jocelyn Crane described a stimulating zoological conference she attended in India. Later, in the fall, David Hancock wrote about his expedition to collect Tufted Puffins for the Zoo's Aquatic Birds Building. Both were well received.

# JACKSON HOLE BIOLOGICAL RESEARCH STATION

L. FLOYD CLARK, Director

The facilities at the Jackson Hole Biological Research Station have been improved by the recent completion of a library-seminar building, three cabins and a pole-fence enclosure for use as a retaining pasture for pack horses. These new developments were made possible through cooperative financing by the New York Zoological Society and the University of Wyoming, joint sponsors of the Research Station.

The following research projects were conducted during the summer of 1965.

Margaret Altmann—A comparative study of interspecies communications. Supported by National Science Foundation.

Alan A. Beetle—Trends in vegetation in Teton County, Wyoming. Assisted by Dean Johnson, Myron Wakkuri, and Francis Jozwik; supported by Wyo. Natural Resource Board, Teton Natl. Forest Permittees Assoc., and Wyo. Agri. Exper. Station.

Kenneth L. Diem and Garth S. Kennington—Some aspects of plant and animal distribution as affected by geologic formations. Assisted by Robert Casebeer, Archibald Cowan, and Douglas Flack; supported by New York Zoological Society and University of Wyoming.

William C. Edwards-The ecology of the bog birch.

Douglas Flack—Observations on some bird communities in Grand Teton National Park. Supported by National Park Service under Student Conservation Program.

Douglas B. Houston—An ecological-physiological study of moose. Supported by National Park Service.

Richard Lee Kroger—Analysis of the insect fauna of the Snake River. Supported by National Park Service.

Robert W. Lichtwardt—Fungi living in the guts of Arthropods. Dr. Hiroharu Indoh from Tokyo University participated in this study, supported by National Science Foundation U.S.-Japan Cooperative Program.

John S. Mackiewicz—Non-segmented tapeworms of western suckers. Supported by Research Foundation, State University of New York.

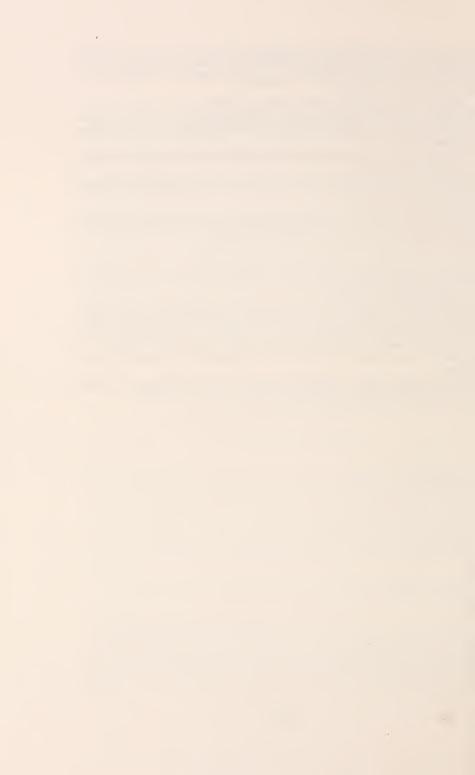
Glenn A. Noble—Stress and parasitism. Assisted by Joseph M. Choi; supported by National Science Foundation.

Edward Oswald and John H. Rumely—Plant ecological studies in Grand Teton National Park: Coniferous communities. Supported by National Park Service.

Meredith J. Plaxton—A biological survey of the Oxbow bend of the Snake River. Supported by National Park Service under Student Conservation Program.

Carol J. Snow—Behavior of wild coyotes. Supported by New York Zoological Society.

Dale L. Taylor—Biotic succession in lodgepole pine in Yellowstone National Park. Supported by New York Zoological Society.



## FINANCIAL STATEMENTS

#### NEW YORK ZOOLOGICAL SOCIETY

#### BALANCE SHEET • December 31, 1965

А		

Cash	\$ 804,392.75
Investments (quoted market value \$15,172,295.39)	11,884,733.39
Receivables:         \$ 293,89           City of New York         \$ 27,65           Other         27,65	
Inventories, at cost:         35,45           Park facilities         35,45           Aquarium         6,97	
Facilities' assets, at cost less depreciation:         333,74           Zoological Park (note 1)         333,72           Aquarium         23,72	
Prepaid expenses and deferred charges National collection of heads and horns, art gallery, library and sundry items Collection of living animals at Jackson Hole Research Station buildings Coney Island real estate  A mounts	39,599.77 1.00 1.00 1.00 1.00 1.00 \$13,450,188.78
LIABILITIES AND FUNDS	
Accounts payable and accrued expenses	272,996.93
Funds:         Endowment funds – principal nonexpendable (Exhibit C)         2,315,900           Funds functioning as endowment – principal expendable (Exhibit C)         5,238,82:           General funds (Exhibit D)         3,585,02:           Special purpose funds (Exhibit E)         2,037,440	3.37 7.18 0.80
	13,177,191.85 \$13,450,188.78
	\$13,450,188.78

See accompanying notes to financial statements.

## STATEMENT OF INCOME, EXPENDITURES AND APPROPRIATIONS Year ended December 31, 1965

1 cai	ended December 31,	1900	
icome:	Gross	Costs	Net
Investments-interest and dividen	ds \$ 512,174.33	_	512,174.33
Gain on disposal of investments,	net 109,158.88	_	109,158.88
Annual dues		_	113,668.66
Gifts for operations	27,051.50	_	27,051.50
Portion of special purpose grants			
operating costs		-	24,717.51
Sales of publications and photogra		-	9,396.00
Other			16,401.13
	812,568.01	_	812,568.01
Transfer from special purpose fun oological Park:	ds 1,633,591.77	-	1,633,591.77
Operations and maintenance	1 241 254 54°	1,490,641.30	(249,386.76)
Facilities and admissions		1,034,817.07	326,312,40
lew York Aquarium:	1,001,1=011.	2,002,021101	0_0,0
Operations and maintenance	307,064.45°	484,478.40	(177,413.95)
Facilities		82,222.05	73,466.87
Total	\$5,511,297.16	3,092,158.82	2,419,138.34
xpenditures:			
Improvements:			
Zoological Park		.\$ 185,216.55	
New York Aquarium			
Research		. 221,232.12	
Purchase of living animals			
Conservation of natural resources			
Education			
Publications			
Membership			
Executive			
Employee benefits			
Other			
Total expenditures			2,141,015.29
Excess of income over expen-			278,123.05
appropriations to special purpose fu	nds	•	326,312.40
Net change for year			\$ (48,189,35)
Distributed as follows:			
General working fund		•	(84,859.18)
General development fund			36,669.83
			\$ (48,189.35)
	Zoological	New York	
Includes:	Park	Aquarium	
D 11 11 CH (27 77 1	44 4 44 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		

iee accompanying notes to financial statements.

Provided by City of New York...

Aquarium admission fees ...

.\$1,241,254.54

\$1,241,254.54

97,180.30

209,884.15

307,064.45

## STATEMENT OF CHANGES IN ENDOWMENT FUNDS AND FUNDS FUNCTIONING AS ENDOWMENT

#### Year ended December 31, 1965

Balance at beginning of year	Endowment funds \$ 2,085,309.75	Funds functioning as endowment 5,139,230.65
Gain on disposal of investments, net Funds reclassified from special purpose	74,550.16	169,592.72
funds	156,040.59	
	2,315,900.50	5,308,823.37
Deduct transfer to general working fund		70,000.00
Balance at end of year	\$ 2,315,900.50°	5,238,823.37
*Balance consisting of:		
George F. Baker fund	171,885.09	
Cadwalader Animal fund	31,385.14	
Edward P. Casey fund	128,470.21	
Mary Thurston Cockroft fund  Grant fund for the protection	60,530.38	
of wildlife	38,952.42	
Robert Jaffray fund	21,899.20	
Madison Grant scientific research fund	83,327.00	
William Pyle Philips fund	15,983.29	
Rockefeller fund	1,587,791.22	
Jacob H. Schiff fund	167,647.42	
Stokes bird fund	8,029.13	
	\$ 2,315,900.50	

See accompanying notes to financial statements.

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#### STATEMENT OF CHANGES IN GENERAL FUNDS

#### Year ended December 31, 1965

	Total	working	development
Balance at beginning of year	\$ 3,911,097.10	33,306.22	3,877,790.88
Gifts and legacies	1,543,695.45	_	1,543,695.45
for the year	(48,189.35)	(84,859.18)	36,669.83
Transfers:			
Funds functioning as endowment	70,000.00	70,000.00	_
Special purpose funds	(1,884,902.03)	_	(1,884,902.03)
Direct expenditures	(6,673.99)	-	(6,673.99)(1)
Balance at end of year	\$ 3,585,027.18	18,447.04	3,566,580.14(2)(3)

(1) Direct costs for fund raising expenses of campaign office.

(2)	Ba	lance	consis	ting	of:

General capital funds	\$ 1,708,315.74
General uses	1,390,983.64
New York Zoological Park uses only	128,480.00
Planting and landscaping in the New York Zoological Park	8,410.74
Scientific purposes only	27,093.30
Marine Biological Laboratory	25,000.00
Wildlife Survival Center	52,706.35
Research Center in the New York Zoological Park	47,990.37
African Plains project	100.00
Bear dens	1,000.00
World of Birds construction	176,500.00
	\$ 3,566,580.14

<sup>(3)</sup> Not including pledges.

See accompanying notes to financial statements.

## STATEMENT OF CHANGES IN SPECIAL PURPOSE FUNDS Year ended December 31, 1965

Balance at beginning of year	\$1,039,575.12
Additions:	
Gifts and grants:	
U. S. Government	
Other	
Investment income	
Loss on disposal of investments (39.33) Transfers and appropriations:	
Operations	
General funds 1,884,902.03	2,812,215.55
	0.051.700.67
	3,851,790.67
Deduct transfers to income:	
Amount equivalent to expenditures for purposes of the various funds:	
U. S. Government	
Other	
1,633,591.77	
Funds reclassified to endowment funds 156,040.59	
Operating costs	
	1,814,349.87
Balance at end of year	\$2,037,440.80*
*Consisting of:	
Conservation account	30,839.35
William E. Damon fund	51,098.44
Animal fund	19,761.39
African Wildlife fund Damon Runyon Memorial fund	39,167.79 152.65
Doris Duke Foundation grant	6,296.36
Michael Grzimek Memorial fund	127.00
The John A. Hartford Foundation grant	102,085.47
Improvement and repair account	15,140.90
Henry Krumb fund	6,327.73
Income from Madison Grant Scientific Research fund	7,776.37
Park improvement account	2,741.27 28,311.99
Institute for Research of Animal Behavior fund	1,132.15
National Institute of Health Grant	3,070.45
Argentine Wildlife Film fund	2,000.00
Carried forward	\$ 316,029.31

#### Consisting of, continued:

Brought forward	\$	316,029.31
Scholarship loan program fund		1,337.33
Kodiak and polar bear fund		4,820.40
The world of birds fund		8,069.37
The world of darkness fund		322,842.40
Poisonous Snakes of the World fund		403.52
Argentina photographic expedition fund		375.60
Kangaroo house, eagle and vulture fund		2,098.44
Park facilities operating fund		648,136.14
Aquarium construction fund		733,328.29
	\$2	,037,440.80

See accompanying notes to financial statements.

#### Notes to Financial Statements

- (1) Park facilities' assets are subject to an agreement with the City of New York, and the net income from park facilities' operations may be used only for the purchase of animals and the improvement of Zoological Park.
- (2) The balance sheet does not include the assets and liabilities of the Pension Fund.
- (3) The New York Zoological Society and the City of New York have agreed to construct an Aquarium, as funds become available, at an estimated total cost (to be shared equally) of \$7,100,000.00, of which the initial stage (of approximately \$1,550,000.00) was completed May 31, 1957.
- (4) The Society received a yacht valued at \$40,000.00 as a gift in 1965. This gift will be recorded in the accounts in the year of sale.
- (5) The Society received a legacy in 1965 consisting of a one-third interest in a parcel of land and other assets having a total valuation of approximately \$270,000.00. These assets have been placed in trust with the San Diego Trust and Savings Bank and will be recorded in the accounts in the year of sale.

#### PEAT, MARWICK, MITCHELL & CO.

CERTIFIED PUBLIC ACCOUNTANTS Seventy Pine Street New York, New York 10005

#### ACCOUNTANTS' REPORT

THE BOARD OF TRUSTEES
NEW YORK ZOOLOGICAL SOCIETY:

We have examined the balance sheet of New York Zoological Society as of December 31, 1965 and the related statements of income, expenditures and appropriations and changes in fund balances for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. It was not practicable to confirm the receivable from the City of New York by communication with it, but we satisfied ourselves as to the amount by means of other auditing procedures. As to gifts, grants and legacies, it was not practicable because of their nature to extend the examination beyond accounting, on a test basis, for the receipts as recorded.

In our opinion, the accompanying balance sheet and statements of income, expenditures and appropriations and changes in fund balances present fairly the financial position of New York Zoological Society at December 31, 1965 and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Peat, Marwick, Mitchell & Co.

March 17, 1966

## THE PENSION FUND

(Founded by Andrew Carnegie)

## STATEMENT OF CASH TRANSACTIONS

Year ended December 31, 1965

В	alance at beginning of year: Investments (quoted market value \$3,117,580.58). Uninvested balance of cash		\$2,469,855.11 73,635.15
	Uninvested paramee of cash	•••••	2,543,490.26
R	eceipts:		
	Income from investments:		
		60,355.25	
		65,716.85	
		26,072.10	
		23,038.77	
	Contributions by New York Zoological Society		
	(see note)	281.93	149,392.80
			2,692,883.06
E	xpenditures:		
	Refunds on account of resignations	6,251.26	
	Pension disbursements	61,753.36	
	Actuarial and custodian fees	9,632.67	77,637.29
			2,615,245.77
N	let gain on investment transactions		204,489.81
	Value		<del></del>
	Quoted		
	market Book		
n			
B	alance at end of year:		
	Investments:		
	Bonds \$1,872,155.01 1,946,920.27 Preferred		
	stocks 167,662.50 171,543.82 Common		
	stocks 1,163,807.88 612,412.27		
		30,876.36	
		88,859.22	
	Omnvested parance of cash	00,009.22	A0 010 MOF TO
			<b>\$2,819,735.58</b>

Note: Represents employer's share of absentee dues paid by employees in 1965 for periods prior to July 1, 1964.

### PEAT, MARWICK, MITCHELL & CO.

CERTIFIED PUBLIC ACCOUNTANTS Seventy Pine Street New York, New York 10005

### ACCOUNTANTS' REPORT

THE BOARD OF TRUSTEES

NEW YORK ZOOLOGICAL SOCIETY:

We have examined the statement of cash transactions of The Pension Fund (founded by Andrew Carnegie) of the New York Zoological Society for the year ended December 31, 1965 and the supporting schedule of investments as of December 31, 1965. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying statements of cash transactions for the year ended December 31, 1965, together with the aforementioned supporting schedule, presents fairly the results of cash transactions of The Pension Fund of the New York Zoological Society for the year then ended and the assets of the Fund at December 31, 1965, on a basis consistent with that of the preceding year.

Peat, Marwick, Mitchell & Co.

February 17, 1966

## PEAT, MARWICK, MITCHELL & CO.

CERTIFIED PUBLIC ACCOUNTANTS Seventy Pine Street New York, New York 10005

## ACCOUNTANTS' REPORT

THE BOARD OF TRUSTEES

NEW YORK ZOOLOGICAL SOCIETY:

We have examined the statement of the Principal Fund of the Permanent Wild Life Protection Fund for the year ended December 31, 1965, set forth below:

Amount due from New York Zoological Society	\$ 2,966.71
Investments, at book value (quoted market value \$246,493.50)	202,150.13
Amount of Fund at beginning of year \$ 205,081.74	
Add prior year adjustment, less loss on invest-	
ment transaction	
Principal Fund at end of year.	\$ 205,116.84

Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In accordance with the agreement establishing this Fund, the income from the investments of \$9,798.35 was paid over to the New York Zoological Society to be used for the specific purposes set forth in such agreement.

In our opinion, the above statement of Principal Fund presents fairly the financial position of the Permanent Wild Life Protection Fund at December 31, 1965, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year. The supplementary data included in Schedule 1 have been subjected to the same auditing procedures and, in our opinion, are stated fairly in all material respects when considered in conjunction with the statement of Principal Fund.

PEAT, MARWICK, MITCHELL & Co.

March 1, 1966

## NEW YORK ZOOLOGICAL SOCIETY

I NCORPORATION of the New York Zoological Society by the State of New York was accomplished under Chapter 435 of the Laws of 1895 and the basic purposes of the Society were embodied in Section 2:

Said corporation shall have power to establish, maintain and control zoological parks, gardens, or other collections for the promotion of zoology and kindred subjects, and for the instruction and recreation of the people. Said corporation may collect, hold and expend funds for zoological research and publication, for the protection of wild animal life, and for kindred purposes, and may promote, form, and co-operate with other associations with similar purposes, and may purchase, sell, or exchange animals, plants, and specimens appropriate to the objects for which it was created.

Subsequently, at a special meeting of the Commissioners of the Sinking Fund, City of New York, held on March 24, 1897, a resolution was passed allotting South Bronx Park for the use of the New York Zoological Society and establishing the terms of a management agreement under which the Society has operated since that date, with only minor modifications.

The resolution of March 24, 1897, and the supplemental agreement of January 24, 1942, provided that the Society should furnish the original equipment of buildings and animals, that it should raise \$250,000 by subscription within three years of the date of starting work on the improvement of the grounds, that the Society should have the right to establish an endowment fund to be used solely for the general uses and purposes of the Society unless otherwise specified by the donors, that the City of New York should provide funds for the maintenance and care of the Zoological Park and for the maintenance of the animal collections, that the Zoological Park should be open to the public free at least four days a week, that the Society may expend the net proceeds of facilities only for the purchase of animals and the improvement of the Zoological Park and that the Society should have the right to make and control all appointments of employees and to fix salaries and make promotions.

## NEW YORK ZOOLOGICAL SOCIETY

## Organized 1895

## Presidents

	resuents
I.	Andrew H. Green
II.	Levi P. Morton
	Henry Fairfield Osborn
	Madison Grant
	W. REDMOND CROSS
	Fairfield Osborn
	First Vice-presidents
Т	J. Hampton Robb
	HENRY FAIRFIELD OSBORN
	Samuel Thorne
	Madison Grant
	Frank K. Sturgis
	W. REDMOND CROSS
	Kermit Roosevelt
	Alfred Ely
	Laurance S. Rockefeller
121	Environ D. Room Hilliam
-	Second Vice-presidents
I.	Charles E. Whitehead
	JOHN L. CADWALADER
	Madison Grant
	Frank K. Sturgis
	Henry D. Whiton
	Kermit Roosevelt
	Alfred Ely
VIII.	Laurance S. Rockefeller
	Honorary Vice-president
I.	DeForest Grant
	Treasurers
I.	L. V. F. RANDOLPH
	Charles T. Barney
	Percy Rivington Pyne
	Cornelius R. Agnew
	David Hunter McAlpin

## Secretaries

I.	Madison Grant	to	1925	
II.	WILLIAM WHITE NILES	to	1935	
III.	Fairfield Osborn	to	1940	
IV.	Harold J. O'Connell1941	to	1959	
	G. W. MERCK			
	JOHN ELLIOTT			
	Chairmen, Executive Committee			
Т	Charles E. Whitehead	to	1806	
	HENRY FAIRFIELD OSBORN			
	CHARLES T. BARNEY			
	HENRY FAIRFIELD OSBORN			
	Madison Grant			
	W. Redmond Cross			
	Laurance S. Rockefeller			
	Laurance S. Rockefeller	ιο	1340	
IA.	LAURANCE 5. NOCKEFELLER1945			
Directors				
I.	WILLIAM T. HORNADAY			
	Zoological Park	to	1926	
II.	CHARLES H. TOWNSEND			
	New York Aquarium	to	1937	
III.	W. Reid Blair			
	Zoological Park1926	to	1940	
IV.	ALLYN R. JENNINGS			
	Zoological Park	to	1941	
V.	CHARLES M. BREDER, JR.			
	New York Aquarium1937	to	1943	
VI.	John Tee-Van		1050	
	Zoological Park	to	1956	
X 7 T 7	General Director, Zoological Park & Aquarium. 1956	to	1962	
VII.	Christopher W. Coates New York Aquarium1956	+0	1064	
<b>37777</b>		ιο	1904	
V 111.	JAMES A. OLIVER Zoological Park	to	1959	
IX	WILLIAM G. CONWAY	to	1000	
121.	Zoological Park			
X	Paul L. Montreuil			
21.	New York Aquarium			

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THE NEW YORK ZOOLOGICAL SOCIETY was founded in 1895 for the "instruction and recreation of the people" through the establishment of a Zoological Park, for the promotion of zoology through exhibition of collections, publications, research and exploration, and for the conservation of animal life of the world. Since 1899 the Zoological Society has directed the New York Zoological Park and in 1902 it was entrusted with the management of the New York Aquarium.

MEMBERSHIP is actively invited of all persons who are interested in the objects of the Society and desire to contribute towards its support.

Annual Membership is \$15. Contributing Membership is \$25. Supporting Membership is \$100. These Memberships entitle the holders to Member's cards for admission (including parking) to the Zoological Park on pay days, and 5 to the Aquarium on any day; a copy of the Annual Report; a subscription to Animal Kingdom, the bi-monthly publication of the Society; privileges of the Library and Members' Lounge in the Administration Building of the Zoological Park and to attend all open meetings of the Society. Tickets to all sections of the Zoological Park for which an admission charge is made are available, free, to Members upon application at the Administration Building in person. Members will be taken on "behind the scenes" tours of the Zoological Park and Aquarium, without charge, on application, and are entitled to 20% discount on all publications of the Society. We are advised that Contributing and Supporting Membership fees are deductible from income tax within the legal limits.

LIFE MEMBERSHIP is \$500. See By-laws for conversion of Annual, Contributing and Supporting to Life Membership. Other classes of membership are: Patron, \$1,000; Associate Founder, \$2,500; Founde

\$5,000; Founder in Perpetuity, \$10,000; Benefactor, \$25,000.

APPLICATIONS for membership may be submitted to any officer of the Society at the Zoological Park or the Aquarium, or to the Society's general office at 630 Fifth Avenue, New York, N.Y. 10020.

## FORM OF BEQUEST

I do hereby give and bequeath to the "New York Zoological Society," of the City of New York.....

(For purposes of the Federal income tax, contributions to the Society, including a portion of membership dues, are deductible in an amount up to 30% of the donor's adjusted gross income. Bequests to the Society are deductible for Federal estate tax purposes).

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Founders	16
Associate Founders	24
Patrons	73
Life Members	356
Supporting Members	184
Contributing Members	1,706
Annual Members	3,257
Fellows	72
Research Associates	3
Corresponding Members	3
Honorary Members	6
Total	5,742



